Course- Botany (Honours )Part II (continued topic)

# Systems of Classification

**Phylogenetic system of classification**

This system is based on the evolutionary parameters. The term phylogeny was proposed by ***E.H.Haeckel*** in **1866**, who described it as the science of genealogical development in phyla or in other plant or animal group. The theory of evolution in organisms was given by ***Charles Darwin*** with the publication of ***Origin of Species*** in **1859**, the outlook of taxonomy was changed and evolutionary trends were taken into consideration in taxonomy. Systems based on evolutionary trends gained much reliability and popularity. In general, all classifications given on Phylogenetic basis have classified plants according to increasing complexity, i.e. beginning with the simplest forms and proceeding to the complex ones. The most widely known Phylogenetic systems are those of Engler and Prantl (1887-1899), Hutchinson (1926, 1934, 1948, 1959, 1969, 1973), Takhtajan (1969), and Cronquist (1068, 1981). Many Phylogenetic systems have been given but none of them clearly accounts for the true relationships between the species.

***Julius von Sachs*** (1832-1897) was the first botanist who proposed first Phylogenetic classification in 1868 substituting the old systems by his new plan, but that could not be accepted. The most popular Phylogenetic system for plants classification was given by ***H.G. Adolf Engler*** (1844-1930) and ***Karl Anton Eugene Prantl*** (1849-1893). ***Adolf Engler*** was Professor of Botany at Berlin University and Director of Berlin Botanical Gardens from 1889-1921. He gave his classification based on classification given by ***Eichler (1883)***. This system was published in 1887, and later on expanded in a monumental work named as ***Die naturlichen Pflanzenfamilien.*** This explained a detailed account of large number of plant species from Algae to the most evolved plant (Compositae). This was adopted by many taxonomists except the British scientists, who were using ***Bentham and Hooker's*** system. ***Di naturlichen*** was completed in 1915 in 23 volumes. The second volume of this vast work began to be prepared in1924 and in spite of the death of ***Engler*** in 1930 and second world war, eight volumes could be published which was edited by ***Ludwig Diels*** **(**1921), the successor of ***Engler*** as the director of the Berlin Botanical gardens .

***Engler and Diels*** laid down the principles for systematic arrangement of angiosperms and listed conditions accepted as primitive and advanced ones. In the system given by ***Engler and Prantl*** (1887) and then by ***Engler and Diels*** (1936), the families were arranged in order to increasing complexities of the flower, fruit and seed development. According to this system, the naked or having bract like perianth flowers are considered primitive and the more advanced forms possess well differentiated perianth in two series (dichlamydeous,heterochlamydeous,i.e. calyx and corolla in two whorls and look differently).

In this system the monocots are considered more primitive than dicots and the family Orchidaceae to be more advanced and developed than Gramineae.

Following is the brief outline of ***Engler, Prantl and Diel's*** classification:-

**Seed plants (Phanerogams)** - 1**. Monocotyledoneae**

2. **Dicotyledoneae**

3**. Gymnospermeae**

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|---|---|---|---|
| 1. **Monocotyledoneae** | **Orders 11** | | **Number of families 45** |
| | 1. Pandanales---- | 3 | First family Typhaceae |
| | 2. Helobiae------- | 7 | |
| | 3. Triuridales---- | 1 | |
| | 4. Glumiflorae-- | 2 | |
| | 5. Principes---- | 1 | |
| | 6. Synanthae-- | 1 | |
| | 7. Spathiflorae | 2 | |
| | 8. Farinosae | 13 | |
| | 9. Lilliflorae | 9 | |
| | 10. Scitamineae | 4 | |
| | 11. Microspermae | 2 | Last family Orchidaceae |

| | | |
|---|---|---|
| **2. Dicotyledoneae** | **Orders 40** | **Number of families 241** |
| **A.** Archichlamydeae | Total number of orders -30 with 189 families. | |
| | First order Verticillatae, first family Casuarinaceae | |
| | Last order Umbelliflorae, last family Cornaceae | |
| **B.** Sympetalae | Total number of orders-10 with 52 families. | |
| (Metachlamydeae) | First order Ericales, first family Clethraceae | |
| | Last order Campanulatae, last family Compositae | |

**Merits-**

**1.** This system is elaborate and fit for identification of plant species as compared to the earlier systems

**2.** This is Phylogenetic system which is based on the evolutionary background.

**3.** Large artificial group, the *Monochlamydeae* created in Bentham & Hooker's system, was abolished by Engler & Prantl and the members are distributed in a larger group *Archichlamydeae* characterised by free petals

4. One more group of Dicots, the *Sympetalae* was created which correspond to the Gamopetalae of *Bentham & Hooker.*

5. ***Engler*** considered the monocots more primitive than dicots and the orchids more advanced than the Gramineae (grass family)

**Demerits –**

**1** The *Amentiferae* or catkin bearers are being considered as most primitive and precede such petaliferous families as Ranunculaceae and Magnoliaceae.The Amentiferae is not only an artificial assemblage of many families, but they are probably a reduced rather than a primitive group as indicated in Engler's system.

2. The other objectionable feature in Engler's system was his acceptance of dichlamydeous flowers (perianth in two whorls) as being derived from monochlamydeous ones (perianth in one whorl),derivation of parietal placentation from axile placentation, derivation of free central placentation from parietal placentation and his supposition of most of the simple unisexual flowers as primitive.

Continued.