PHYLOGENETIC SYSTEM:

(A brief description of plant classification)

AHMAD MASOOD
DEPTT. OF BOTANY
H.D. JAIN COLLEGE
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(a) The publication of Darwin's "The Origin of Species" in 1859 revolutionised the biological thinking.

(b) The phylogenetic systems are based on the course of evolutionary descent. The genetic and phylogenetical relationships are tried to establish amongst the taxonomic groups / taxa.

(c) There were attempts to rearrange the earlier natural systems in the light of phylogenetic considerations.

(d) After Bentham & Hooker's, all the systems were placed under phylogenetic systems

Some important Contributors:

The natural system of classification formed the basis of identification & characterisation of plants by considering gross morphological and some anatomical characters. The relationships on certain pre-selected characters were considered of phylogenetic importance and after discussed at length in all the three systems which were conceptualised or developed after 1859.

August Wilhem Eichler (1839-1887):

A German, who developed the first phylogenetic system, was known for his original work. The system initially appeared in his Blütendiagramme (1875-78) and then in successive editions of his Syllabus (1876-90). After his death, his colleague Adolf Engler (1844-1930) continued its development, and it became widely accepted.

He divided the whole plant kingdom.
A brief description is as follows:

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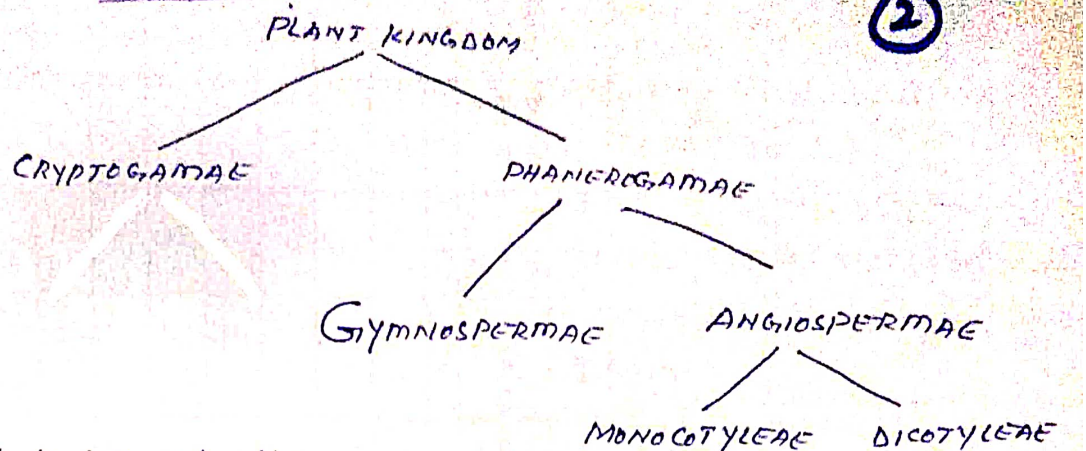
Outline of Eichler's System



Important considerations

1. Gymnosperms placed before angiosperms, with separate identity,
2. Monocotyledons placed before Dicotyledons
3. In dicotyledons only two groups — chloropetalae & sympetalae were recognised.
4. He made an attempt to arrange the families in supposedly primitive to advanced series.
5. The phylogenetic consideration was in transitional phase, so several objections were raised by subsequent taxonomists.

Adolph Engler (1844-1930) and Karl A.E. Prantl (1849-1893):

(Popularly known as Engler & Prantl System)

- The two German botanists developed a system of classification based on Eichler from which it differs only in matters of details.
- Their system was also a step in the direction of phylogenetic systems of classification, but still considered a transitional stage classification because several information, like Eichler's, was not found to be ~~absolute~~ appropriate.
- They published a twenty-three volume work, Die natürlichen Pflanzenfamilien (1887-1899) wherein they classified the plants from algae to Angiosperms.
- A one volum work was published by Engler as "Syllabus der Pflanzenfamilien" in which a complete revision of plant families was made. It was published in several editions, the latest being 12th edition (1964) and 13th edition (2009)

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Significant features of Engler & Prantl System

1. Monocots were placed before Dicots — Not appropriate from evolutionary point of view
2. Catkin bearing Dicots (Amentiferae) considered by him as primitive to the flowers which bear petals and simple unisexual flowers. — The simplicity is due to the evolutionary reduction and not primitiveness.
3. Dichlamydous flowers considered by him as advanced character — Flower with sepals petals are now considered primitive. Flower with perianth (monochlamydous) advanced.

PLANT KINGDOM
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EMBRYOPHYTA SIPHONOGAMA
- GYMNOSPERMS (7 orders)
- ANGIOSPERMS (2 Classes)
  - MONOCOTS (11 orders, 45 families)
  - DICOTS (44 orders, 261 families)
    - ARCHICHLAMYDAE (33 orders)
    - METACHLAMYDAE (11 orders)

Charles Edwin Bessey (1845-1915):

- An American, the first person who made a significant contribution by giving an intentional Phylogenetic System (also the first American to make a major contribution in plant classification)
- He based his classification on Bentham and Hooker's system and modified it in the light of his 28 dicta, published Annals of the Missouri Botanical Garden under the title "The Phylogenetic Taxonomy of flowering plants". in 1915.
- His dicta (guiding principles) included his ideas concerning primitive and advanced characters.
- He considered angiospermic plants to have evolved strobiliferous cycad ancestors, probably the Bennettitales.
- Bessey initiated representing evolutionary relationship through an evolutionary tree with primitive groups at the base and the most advanced at the tips of branches. His diagram resembling a cactus plant — Besseyan Cactus.

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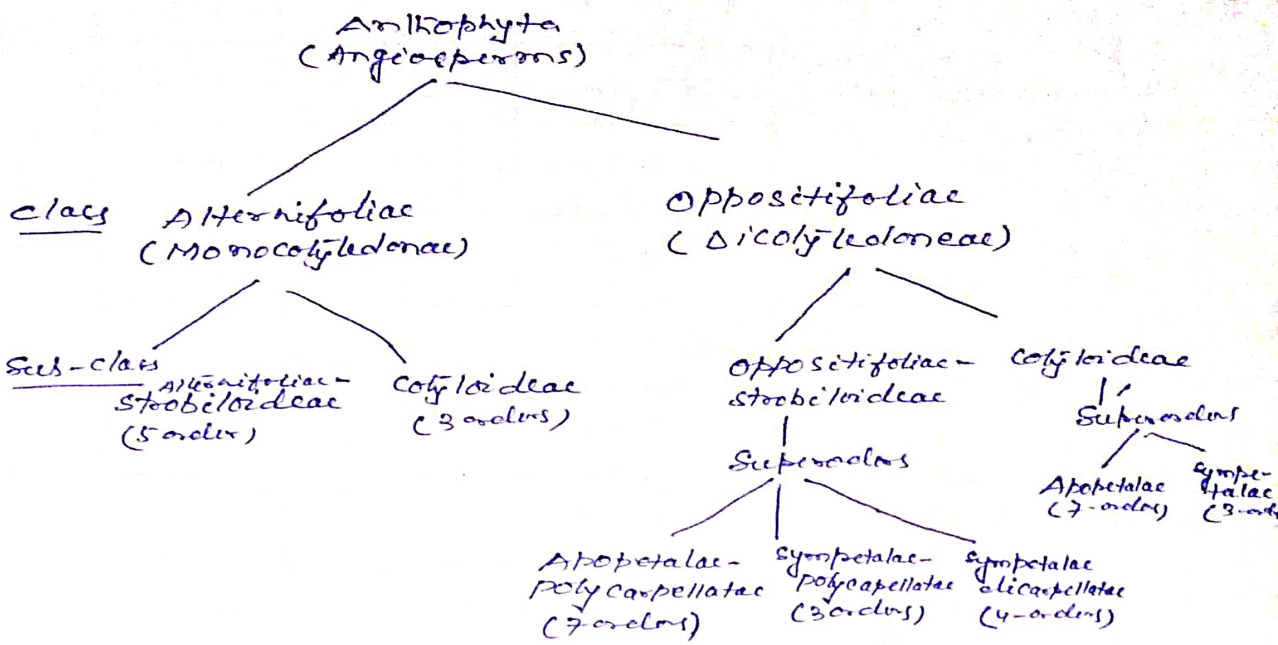
Outline of Bessey's classification of Angiosperms



Note: He used the same names for the sub-classes of both monocots and dicots. This is in contrary to the rules of plant nomenclature which requires that names to be unique. However, Bessey actually used a qualifying hyphenation (Alternifoliae-Stobiloideae, and Oppositifoliae-Stobiloideae).

With some modifications most modern classifications for example those of Cronquist (1981, 83, 88), Takhtajan (1969, 1980, 1983, 1991), Dahlgren (1975, 1980, 1983, 1989), Thorne (1976, 1981, 1983, 1992) follow the Bessey tradition.

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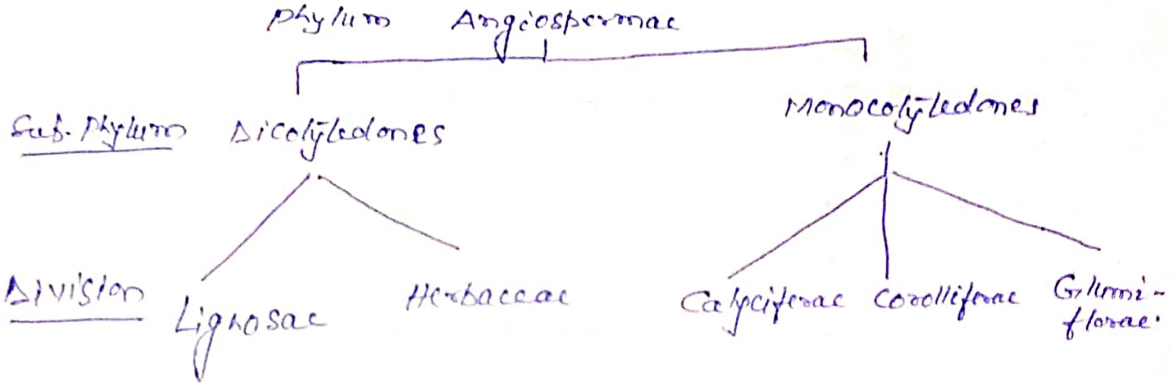
John Hutchinson (1884 – 1972):

- A British botanist, proposed a system of classification which was based on those of Bentham & Hooker and Bessey.
- The system was published as "The families of flowering plants", based on probable phylogeny in three editions – 1st 1926 (Dealing with Dicotyledons) & 1934 (Dealing with Monocotyledons); 2nd edition 1959; 3rd edition 1973.
- His classification was based on 24 Principles.
- Dicots are considered more primitive than monocots
- Magnoliales among dicots and Butomales among monocots are considered primitive orders.

An outline of Hutchinson's classification



Note - The details will be discussed separately.

Contemporary Phylogenetic Systems

A number of contemporary botanists are involved in improving schemes of classification based on new information from various sources like - palaeobotany, phytochemistry, improved techniques of numerical analysis of available data etc. They developed their system of classification

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that have several features in common, though differing in basic concepts. Among these included

- Armen Takhtajan (1910-1997),
- Arthur Cronquist (1919-1992),
- Robert Thorne (1920-2015)
- Rolf Dahlgren (1932-1987)

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Further Reading

1. Plant Systematics – Gurucharan Singh
2. Taxonomy of Angiosperms – V. Singh & D.K. Jain.

AHMAD MASOOD