

Bentham and Hooker's Classification

George Bentham and Sir J.D. Hooker classified seed plants. This is a natural system of classification because it considers natural affinity and interrelationships among the taxa. This classification was more or less influenced by the system of classification developed by de Candolle.

Bentham and Hooker presented their work in three volumes, entitled Genera Plantarum.

Special features of this system

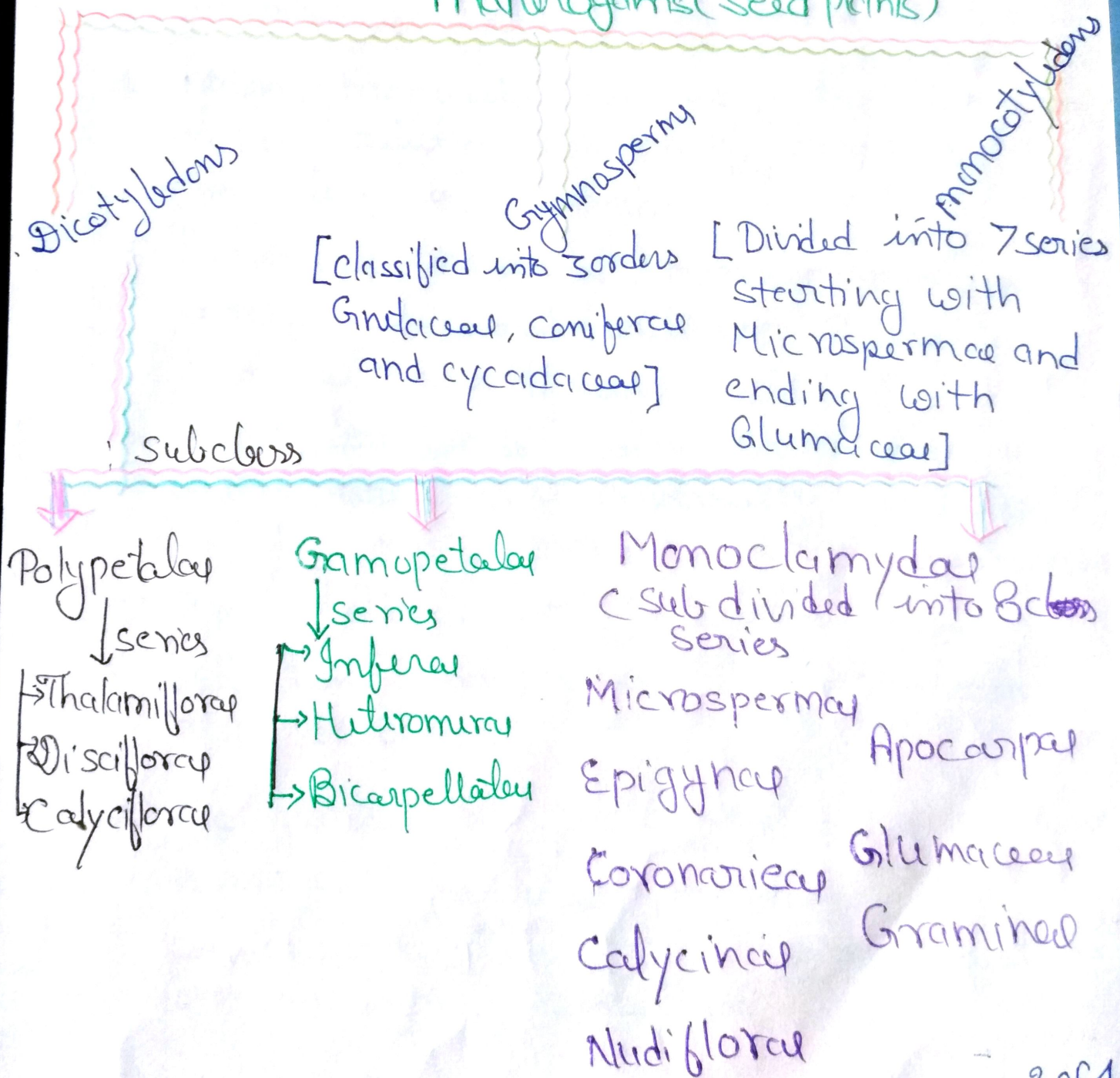
1. It is the classification of only the 'seed plants' or phanerogams.
2. This classification includes names, descriptions and the classification of all the seed plants known at that time (Approx 97,000).
3. The term 'family' of the modern systematics was designated as 'order' and the term 'order' was named as 'cohort'.
4. Monocotyledons were described after the dicotyledons.
5. The gymnosperms were considered as a third taxon of seed plants and placed between the dicots and monocots.
6. The authors do not mention anything about the origin of the angiosperms.

Classification

The seed plants were classified into 3 classes, 3 subclasses, 21 series, 25 cohorts and 202 orders. Originally it was designated to include 200 orders. Orders Vochysiaceae and Cysilleae were incorporated later and the total number of orders became 202.

The broad classification of Bentham and Hooker may be presented as follows.

Phanerogams (Seed plants)

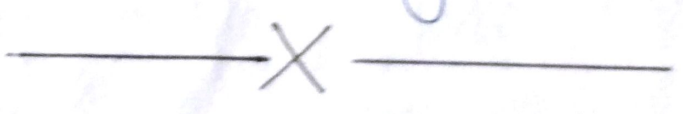


Merits

1. It is very suitable for practical purposes
2. Every genus is sub-divided into genera and sections.
3. Treating cucurbitaceae and Umbelliferae at the end of polypetalae as connecting links between the polypetalous families and gamopetalous families.
4. Among monocots emphasis has been given to the relative position of ovary and the characters of perianth.
5. Placing of unisexual monocot families after bisexual families e.g. Palmae and Araceae after liliaceae.
6. The system starts with the Ranales & which are now universally considered to be most primitive living angiosperms.
7. They believed in evolution through reduction and hence placed monocots after dicots
8. The placing of gamopetalae after polypetalae is justified since union of petals is considered to be an advanced features over the free condition.

1. The gymnosperms are wrongly placed between dicots and monocots and the phylogenetic importance of naked seed is not recognized.
2. Compositae which is a highly advanced family is placed in Inferae at the beginning of Gamopetalae.
3. Orchidaceae which is a highly advanced family is treated in the beginning of monocots.
4. Monoclamydeae is regarded as an artificial ~~seed~~ group recognised on the basis of one character; presence of a single whorl of perianth. As a result, related families are widely separated. For eg Laurineae are related to Magnoliaceae of Ranales, Podostomeaceae belongs to the Ranales.
5. In the use of terminology of different ranks of taxa there is no uniformity.

Although this system has few demerits and pre-evolutionary in concept it has wide application in many countries including India.



Engler and Prantl System of Classification

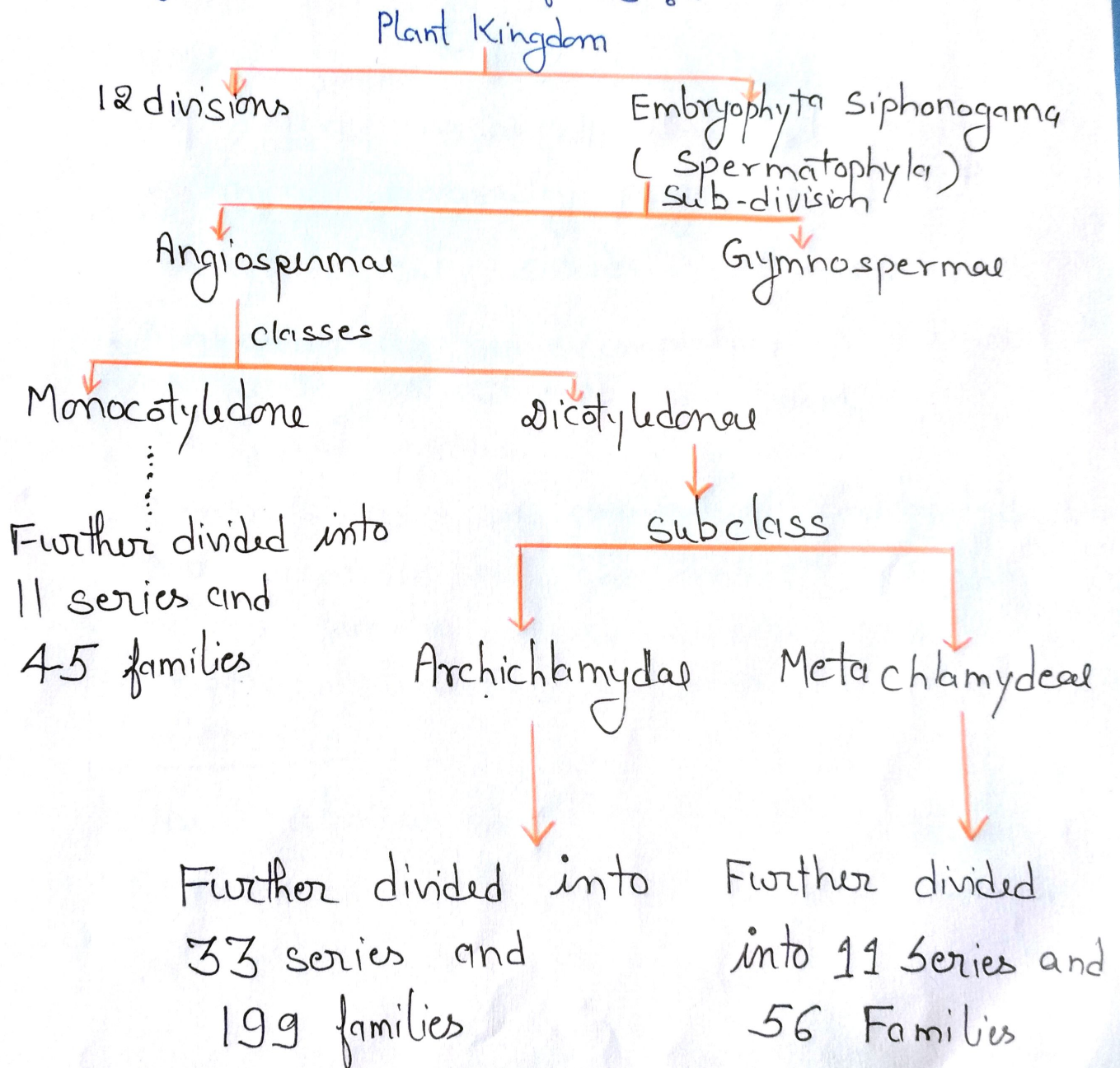
Engler and Prantl system of classification is the first recognised true phylogenetic system of classification. These two German botanists published their classical works in "*Die Natürlichen Pflanzenfamilien*" in 23 volumes.

Specific Features of this system

- In this phylogenetic system, families were arranged according to the increasing complexity of the flower, fruit and seed development.
- In this system, entire plant kingdom (Algae to angiosperms) is classified.
- It is the first angiospermic system to take anatomical data into account.
- They have placed monocots before dicots and treated them as primitive.
- Exhaustive keys to the orders and families are given in this system.
- This system has also embryological, anatomical and morphological data of the families.

Classification

In the Engler and Prantl system of classification the entire plant Kingdom is divided into 13 divisions of these 13 divisions, 13th one is the Embryophyta Siphonogamous (Spermatophyta). In brief, this system of classification may be presented as follows :-



Merits

- It is a phylogenetic system and has partially replaced the Bentham and Hooker's system of classification in Europe and America.
- A key for identification of all genera of plants have given.
- Various groups have been built up step by step and arranged phylogenetically to form a generally progressive morphological series.
- Monoclamydeae is completely abolished as such as it was considered an artificial group.
- Compositae and Orchidaceae are regarded as the most highly evolved families of dicotyledons and monocotyledons respectively.

Demerits

- The relationship of cryptalous families of angiosperms with Gnetales like ancestor is not fully convincing.
- This system shows unisexual families before bisexual ones. It is difficult to support derivation of bisexual families from unisexual ones.

- The order Ranalis in dicots was considered to be an advanced one is now thought to be the most primitive of all angiosperms.
- Placing of monocots before dicots is not acceptable
- Apart from these, this system has been greatly criticised recently as it tends to obscure the phylogeny of angiospermous flowers, in as much as, it suggests its origin from that of the Cycadeoideae-like ancestor, however antagonists of this view suggests that the most primitive flower from which all angiosperms are ultimately derived belongs to Ranalis, which is more convincing.

Every system have some merits as well as demerits. It is certain that the system led the foundation of phylogenetic system of classification on which various modern system of classification evolved.

Hutchinson's System of Classification

C.E. Bessey and Hutchinson were in favour of Ranelian concept for primitive flower. It means Hutchinson was follower of Ranelian school and his system was based on phylogenetic lines.

John Hutchinson published his classification in the form of a book "The families of flowering plants" in two volumes.

Principles of Hutchinson's classification

His classification is based on following principles:-

- Evolution in both upwards and downwards.
- The downward trends involves origin of certain plants through a process of degradation and reduction.
- All parts of the plant may not be involved at a time in the process of evolution. Certain ~~plants~~ parts may be advancing whereas other may be stationary and ~~degenerating~~ degenerating.
- Evolution has generally been persistent in its course. when a particular progression or retrogression has set in, it is persisted into the end of the phylum.

Specific features of this system

- This system classified only flowering plants (phanerogams) on evolutionary basis. Angiosperms were considered monophyletic in origin from some hypothetical protoangiosperms.
- This system is based on the logical interpretation of the theory that the parts of angiospermic flowers are modified leaves.
- It laid emphasis on the old view of arborescent and herbaceous types of primitive dicots and accordingly recognised two sub-phyta - Lignosae and Herbaceae.

According to this system apetalous families have been derived partly from Magnolian and partly from Ranalian stocks.

Merits :-

In this system the families and orders are of small size and comprises only closely related taxa.

Ranales and Magnoliales are considered to be the primitive among the dicotyledons -

The monocots follow the dicots

The origin of angiosperms from ~~progytans~~ proangiosperms which had Bennettitalean characters.

The ~~morphology~~ Monophyletic origin of monocots from dicots through Herbaceae along with Butomaceae and Alismaceae

Demerits :-

The system is of no practical utility from the point of view of identification because this system do not have an artificial key

The division of the dicots into lignosae and Herbaceae is mainly based on habit due to which many closely

related families like Cruciferae, Labiatae, and verbanaceae are separated from one another.

The members of Liliaceae and Amaryllidaceae were clubbed together.

Although Hutchinson's system has not been followed widely, it has provided a sound basis for later phylogenetic system by Oswald Tipp, Cronquist, Takhtajan and others.

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