

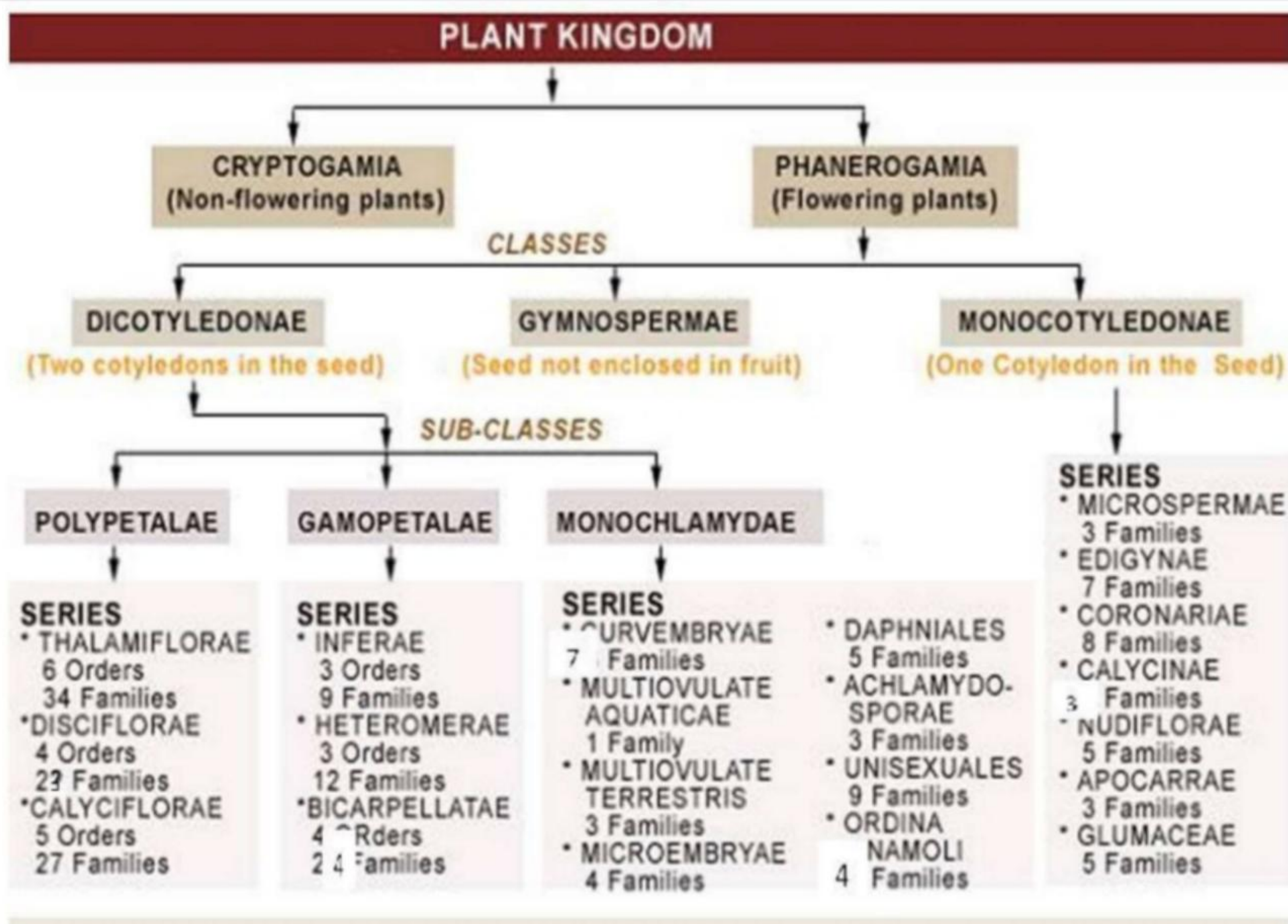
Bentham and Hooker's classification (1862 – '83)

George Bentham and Joseph Dalton Hooker - Two English taxonomists who were closely associated with the Royal Botanical Garden at Kew, England have given a detailed classification of plant kingdom, particularly the angiosperms.

They gave an outstanding system of classification of phanerogams in their ***Genera Plantarum*** which was published in three volumes between the years **1862 to 1883**. It is a natural system of classification. However, it does not show the evolutionary relationship between different groups of plants, in the strict sense. Nevertheless, it is the most popular system of classification particularly for angiosperms. The popularity comes from the fact that very clear key characters have been listed for each of the families. These key characters enable the students of taxonomy to easily identify and assign any angiosperm plant to its family.

Bentham and Hooker have grouped advanced, seed bearing plants into a major division called Phanerogamia. This division has been divided into three classes namely:

1. Dicotyledonae
2. Gymnospermae and
3. Monocotyledoneae



Summary of Bentham and Hooker's classification (1862 – 83)

Phanerogams or spermatophyta are divided into three classes - Dicotyledonae, Gymnospermae and Monocotyledonae

Class - Dicotyledonae – two cotyledons, open vascular bundles, reticulate venation

- I. **Sub-Class Polypetalae** - The flowers are usually with two distinct whorls of perianth; the segments of the inner whorl or "corolla" are free.
 - A. **Series-Thalamiflorae** -(The calyx consists of usually distinct sepals, which are free from the ovary; doom shaped thalamus).
6 Orders/Cohort; 34 Families or Natural orders -R
 - B. **Series – Disciflorae** - The calyx consists of either distinct or united sepals, which may be free or adnate to the ovary; a prominent ring of cushion shaped disc is usually present below the ovary, sometimes broken up into glands; the stamens are usually definite in number, inserted upon, or at the outer or inner base of the disc; the ovary is superior.
4 Orders/Cohorts; 23 Families or Natural orders
 - C. **Series – Calyciflorae** - (Cup shaped thalamus; calyx consists of united sepals, rarely free and adnate to the ovary; the petals are uni-or bi-seriate, and peri-or epi-gynous; the ovary is often inferior).
5 Orders/Cohorts; 27 Families or Natural orders -F,
- II. **Sub-Class Gamopetalae** - (The flowers-are usually with two distinct whorls of perianth; the segments of the inner whorl or 'corolla' are fused).
 - A. **Series – Inferae** - (The ovary is inferior; the stamens are usually equal in number to the corolla lobes).
3 Orders/Cohorts; 9 Families or Natural orders-Ast
 - B. **Series – Heteromerae** - (The ovary is usually superior; stamens are epipetalous or free from the corolla, either equal to or double the number of petals, or indefinite; carpels are more than two in number).
3 Orders/Cohorts; 12 Families or Natural orders
 - C. **Series - Bicarpellatae** - (The ovary is usually superior; stamens are as many as or fewer than the corolla lobes, and alternating with them; carpels are two, rarely lesser or more).
4 Orders/Cohorts; 24 Families or Natural orders S, Ve, La

III. **Sub-class Monochlamydae** - The flowers are with only one non-essential whorl (perianth) or absence of non-essential whorls. It includes 8 series.

A. **Curvembryae**: Usually single ovule, embryo coiled around the endosperm.

6 Families or Natural orders

B. **Multiovulate Aquaticae**: Aquatic plants with syncarpous ovary and many ovules.

1 Familie or Natural order

C. **Multiovulate Terrestris**: Terrestrial plants with syncarpous ovary and many ovules.

3 Families or Natural orders

D. **Microembryae**: Only one ovule, small, tiny embryo endospermic seed.

4 Families or Natural orders

E. **Daphnales**: Only one carpel and single ovule.

5 Families or Natural orders

F. **Achlamydosporae**: Ovary inferior, 1 to 3 ovules - unilocular.

3 Families or Natural orders

G. **Unisexuales**: Flower unisexual, perianth usually absent.

9 Families or Natural orders

H. **Ordines Anomali**: (Anomalous families) Plants with uncertain systematic position but closer to unisexuales.

9 Families or Natural orders

Class - Gymnospermae

3 Families or Natural Orders: (Gnetaceae , Coni ferae, and Cycadaceae)

Class -Monocotyledonae - One cotyledon, closed vascular bundles, parallel venation, trimerous flowers

A. Series -Microspermae - (The ovary is inferior; seeds are minute).

3 Families or Natural orders - Or

B. Series - Epigynae - (With very few exceptions, the ovary is inferior; seeds are large and with a copious endosperm).

7 Families or Natural orders

C. Series - Coronarieae - (The perianth, at least the inner whorl, is petaloid; the ovary is superior).

8 Families or Natural orders L

D. Series -Calycinae - (The perianth is sepaloid; the ovary is superior).

3 Families or Natural orders

E. Series - Nudiforae - (The perianth is usually absent or reduced to minute scales; seeds are albuminous).

5 Families or Natural orders

F. Series -Apocarpeae - (The perianth is absent or uni- or bi-seriate; the ovary is superior with one or more than one free carpels; seeds are exalbuminous).

3 Families or Natural orders

G. Series -Glumaceae - (The perianth is scaly or glumaceous or absent; the ovary is usually one-ovuled; seeds are albuminous).

5 Families or Natural orders - Poa

Merits

- The obvious advantage of the system of Bentham and Hooker's classification is that, it provides one with easy means and ways for identifying a plant.
- The description of families and genera is very accurate
- Each family has a synopsis in the beginning which is very useful in identification
- This classification is a great natural system of its own kind and to a great extent forms an ancestor of every recent system.
- Another importance of this system lies in the extempore study of the actual specimens by the authors and thus the classification of Bentham and Hooker represents the result of a careful comparative examination of known genera of all flowering plants.

Demerits

- The classification is based on the assumption of constancy of species. It establishes no phylogenetic relationship in different taxa of plants; hence many important evolutionary characters were neglected. So, closely related families were kept apart and many distant families of plants were put together e.g., in dicotyledons, Euphorbiaceae was placed in Monochlamydeae though related to Malvaceae; the retention of some natural orders e.g. Nyctaginaceae, Polygonaceae, Amaranthaceae, Chenopodiaceae etc. in the subclass Monochlamydeae is also unnatural because those orders are related to the orders having differentiated perianth. Similarly in monocotyledons Hydrocharitaceae and highly evolved Orchidaceae were put together under Microspermae due to their small seeds. Related families like Liliaceae and Amaryllidaceae were kept apart.
- The origin of angiosperms was not established.
- The position of gymnosperms is also anomalous i.e. in between dicotyledons and monocotyledons.
- The group Monochlamydeae is entirely artificial

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