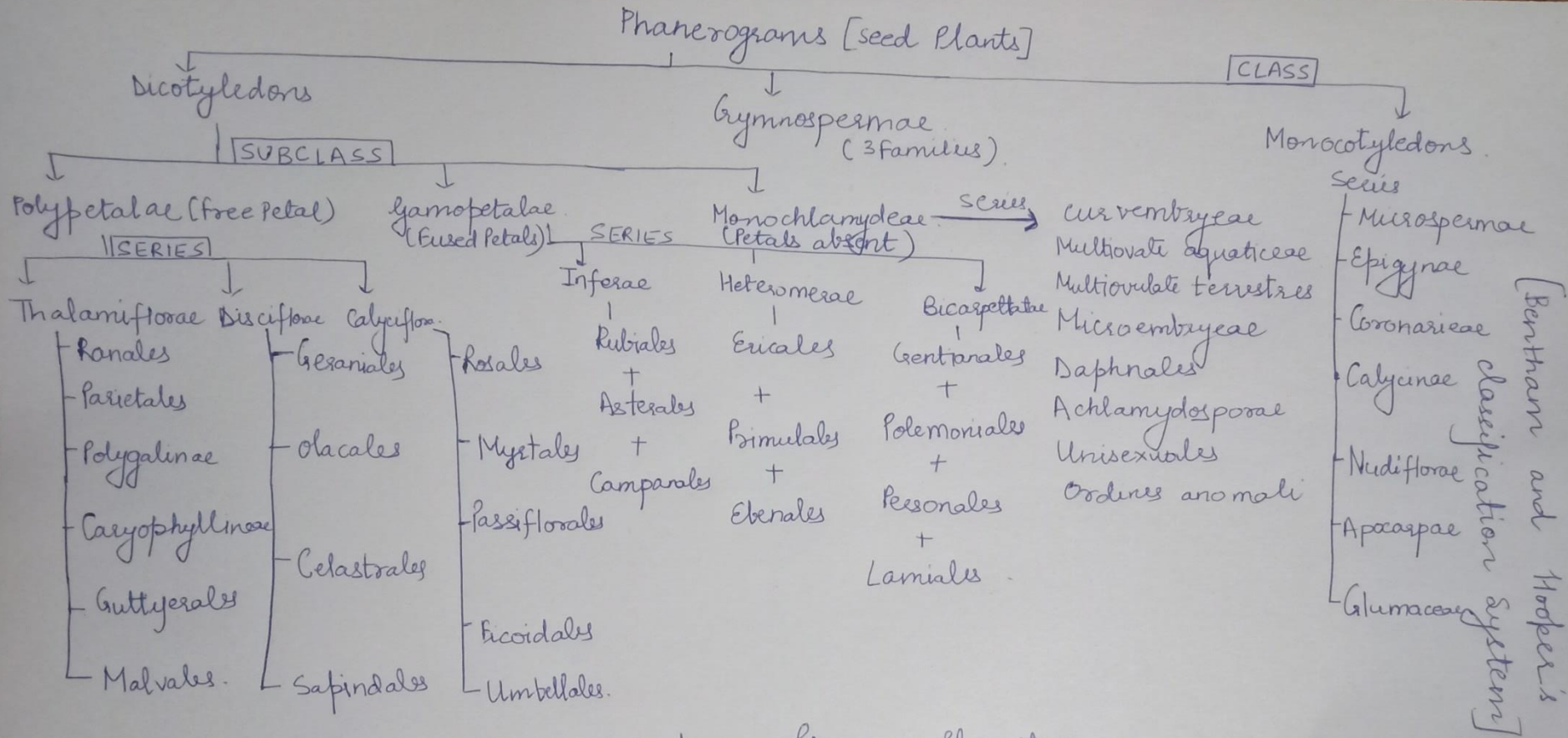


Bentham and Hooker Classification System



- This classification system published in *Genera Plantarum*.
- It describes 202 families & 7569 genera including approximately 97,205 species.
- This classification system is most well developed Natural System.

CLASSIFICATION GIVEN BY BENTHAM AND HOOKER

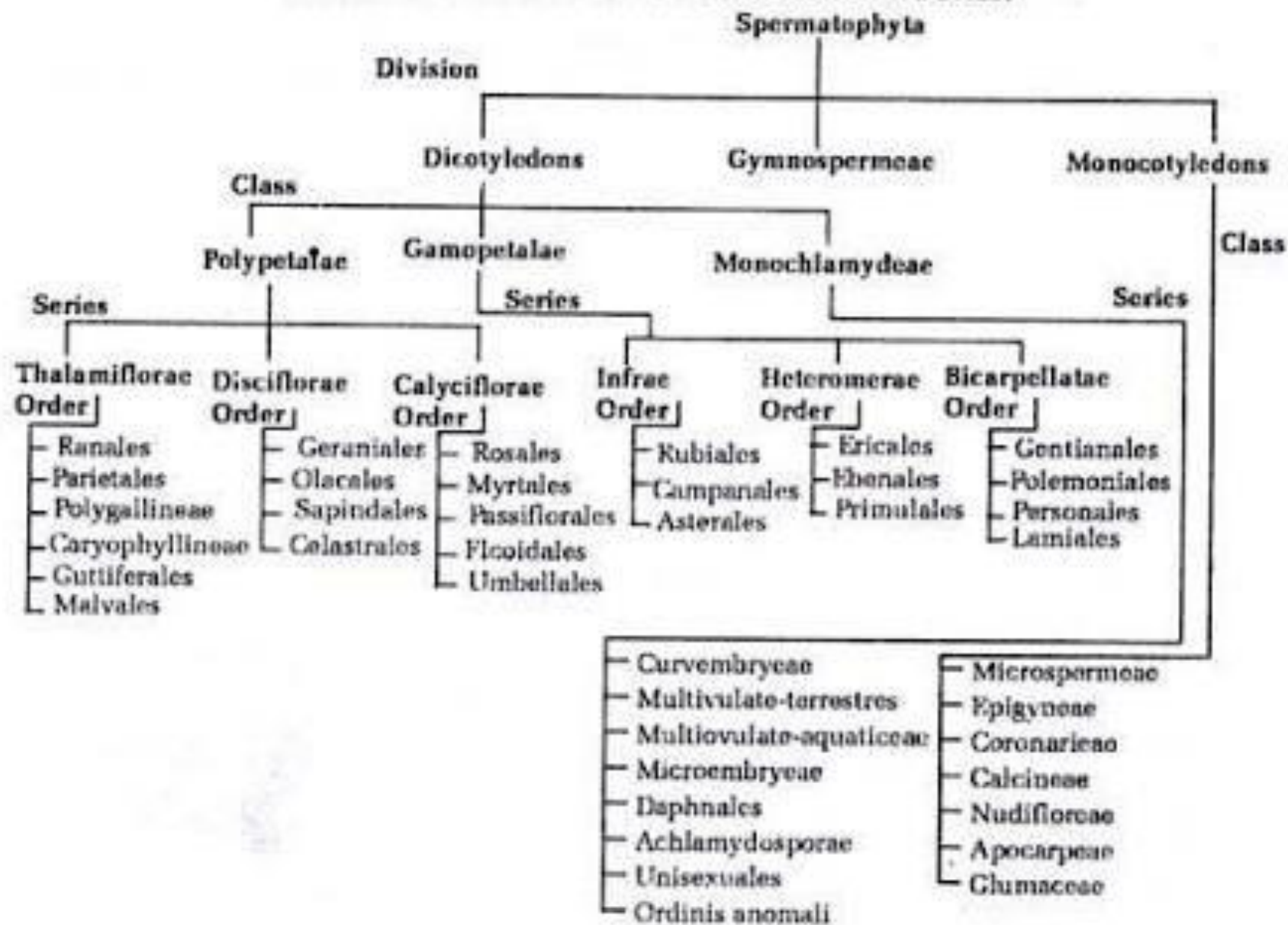




Figure 10.6 Augustin Pyramus de Candolle (1778-1841) who first introduced the term 'taxonomy' in his *Theorie elementaire de la botanique* (1813) [reproduced with permission from the Royal Botanic Gardens, Kew].

features was highlighted and successfully employed in the classification.

Robert Brown (1773-1858)

Robert Brown was an English botanist, who did not propose a classification of his own but demonstrated that Gymnosperms were a group discrete from dicotyledons and had naked ovules. He also clarified the floral morphology and pollination of Asclepiadaceae and Orchidaceae, morphology of grass flower structure of cyathium in Euphorbiaceae and established several families.

George Bentham & Sir J.D. Hooker

The system of classification of seed plants presented by Bentham and Hooker, two English botanists, represented the most well developed natural system. The classification was published in a three-volume work *Genera plantarum* (1862-83). George Bentham (1800-1884) was a self-trained

botanist (Figure 10.7). He was extremely accomplished and wrote many important monographs on families such as Labiales, Ericaceae, Scrophulariaceae and Polygonaceae. He also published *Handbook of British Flora* (1858) and *Flora Australiensis* in 7 volumes (1863-78). Sir J. D. Hooker (1817-1911), who succeeded his father William Hooker as Director, Royal Botanic Gardens in Kew, England was a very well known botanist, having explored many parts of the world (Figure 10.8). He published *Flora of British India* in 7 volumes (1872-97), *Student's Flora of the British Islands* (1870) and also revised later editions of *Handbook of British Flora*, which remained a major British Flora until 1952. He also supervised the publication of *Index Kewensis* (2 volumes, 1893), listing the names of all known species and their synonyms.

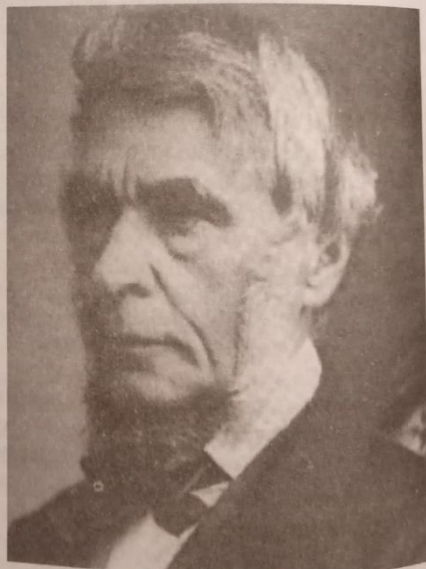


Figure 10.7 George Bentham (1800-1884), co-author of *Genera plantarum* (with J. D. Hooker, 1862-1883), and the author of the 7-volume *Flora Australiensis* and several monographs on major families (reproduced with permission from Royal Botanic Gardens, Kew).

Table 10.4 Outline of the system of classification presented by Bentham and Hooker in *Genera plantarum* (1862-1883).

Phanerogams or seed plants

Class 1. Dicotyledons	(Seed with 2 cotyledons, flowers pentamerous or tetramerous, leaves netveined)
Subclass 1. Polypetalae	14 series, 25 orders and 165 families
Series 1. Thalamiflorae	(sepals and petals distinct, petals free) (flowers hypogynous, stamens many, disc absent)
2. Disciflorae	6 orders: Ranales, Parietales, Polygalineae, Caryophyllineae, Guttiferales and Malvales (Flowers hypogynous, disc present below the ovary)
3. Calyciflorae	4 orders: Geraniales, Olacales, Celastrales and Sapindales (flowers perigynous or epigynous)
Subclass 2. Gamopetalae	5 orders: Rosales, Myrtales, Passiflorales, Ficoidales and Umbellales (sepals and petals distinct, petals united) (ovary inferior)
Series 1. Inferae	3 orders: Rubiales, Asterales and Campanales (ovary superior, stamens in one or two whorls, carpels more than 2)
2. Heteromerae	3 orders: Ericales, Primulales and Ebenales (ovary superior, stamens in one whorl, carpels 2)
3. Bicapellatae	4 orders: Gentianales, Polemoniales, Personales and Lamiales (flowers apetalous; perianth lacking or if present not differentiated into sepals and petals)
Subclass 3. Monochlamydeae	
Series 1. Curvembryae	(embryo coiled, ovule usually 1)
2. Multiovulatae aquaticae	(aquatic plants, ovules many)
3. Multiovulatae terrestres	(terrestrial plants, ovules many)
4. Microembryae	(embryo minute)
5. Daphnales	(carpel 1, ovule 1)
6. Achlamydosporae	(ovary inferior, unilocular, ovules 1-3)
7. Unisexuales	(flowers unisexual)
8. Ordines anomali	(relationship uncertain)
Class 2. Gymnospermae	(ovules naked) 3 families
Class 3. Monocotyledons	(flowers trimerous, venation parallel) 7 series, 34 families
Series 1. Microspermae	(ovary inferior, seeds minute)
2. Epigynae	(ovary inferior, seeds large)
3. Coronariae	(ovary superior, carpels united, perianth coloured)
4. Calycinae	(ovary superior, carpels united, perianth green)
5. Nudiflorae	(ovary superior, perianth absent)
6. Apocarpae	(ovary superior, carpels more than 1, free)
7. Glumaceae	(ovary superior, perianth reduced, flowers enclosed in glumes)

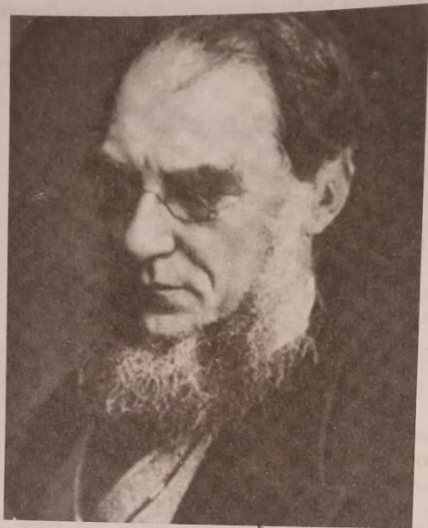


Figure 10.8 Sir Joseph Dalton Hooker (1817-1911), the famous British botanist who co-authored *Genera Plantarum* with George Bentham, besides authoring the 7-volume *Flora of British India* and several other publications. He was the Director of the Royal Botanic Gardens, Kew (reproduced with permission from Royal Botanic Gardens, Kew).

The *Genera plantarum* of Bentham and Hooker provided the classification of seed plants describing 202 families and 7569 genera. They estimated the seed plants to include 97,205 species. The classification was a refinement of the systems proposed by A. P. de Candolle and Lindley, which in turn were based on that of de Jussieu. The delimitation of families and genera was based on natural affinities and was pre-Darwinian in concept. The descriptions were based on personal studies from specimens and not a mere compilation of known facts, an asset which made the classification so popular and authentic. Many important herbaria of the world have specimens arranged according to this system.

The system divided Phanerogams or seed plants into three classes: **Dicotyledons**, **Gymnospermae** and **Monocotyledons**. **Dicotyledons** were further subdivided into three subclasses: **Polypetalae**, **Gamopetalae** and **Monochlamydeae** based on the presence or absence of petals and their fusion. These subclasses, in turn, were subdivided into series, orders (called cohorts by the two authors) and families (called natural orders). No orders (cohorts) were recognized within Monochlamydeae and Monocotyledons, the series being directly divided into families (natural orders). A broad outline of the classification is presented in Table 10.4.

Merits

The fact notwithstanding that the system does not incorporate phylogeny and is more than 100 years old, it still enjoys a reputation of being a very sound system of classification, owing to the following merits:

1. The system has great practical value for identification of plants. It is very easy to follow for routine identification.
2. The system is widely followed for the arrangement of specimens in the herbaria of many countries, including Britain and India.
3. The system is based on a careful comparative examination of actual specimens of all living genera of seed plants and is not a mere compilation of known facts.
4. Unlike de Candolle, the **Gymnosperms** are not placed among dicots but rather in an independent group.
5. Although the system is not a phylogenetic one, **Ranales** are placed in the beginning of **Dicotyledons**. The group Ranales (in the broader sense including families now separated under order Magnoliales) is generally regarded as primitive by most of the leading authors.
6. **Dicotyledons** are placed before the **Monocotyledons**, a position approved by all present-day authors.