

Q. Describe a detail account of the system of classification proposed by Bentham and Hooker's. Discuss its merits and Demerits ?.

or,  
Natural system of classification

→ The system of classification proposed by two British taxonomist Bentham (1800-1884) and Hooker's (1817-1917) were associated with the "Royal Botanical garden keo" England. They published an outstanding classification in their Book "genera plantarum" (1862-1883). The first part of genera plantarum appeared in July 1862 and the last part in April 1883. The system is detail and it is followed in all countries of commonwealth including India.

Basis of classification :-

It is natural system of classification based on the system of classification suggested by De Candolle.

Morphological features of the flowers such as free and fused nature of the petals, presence or absence of the perianth, position of ovary, number of carpels and other characteristics

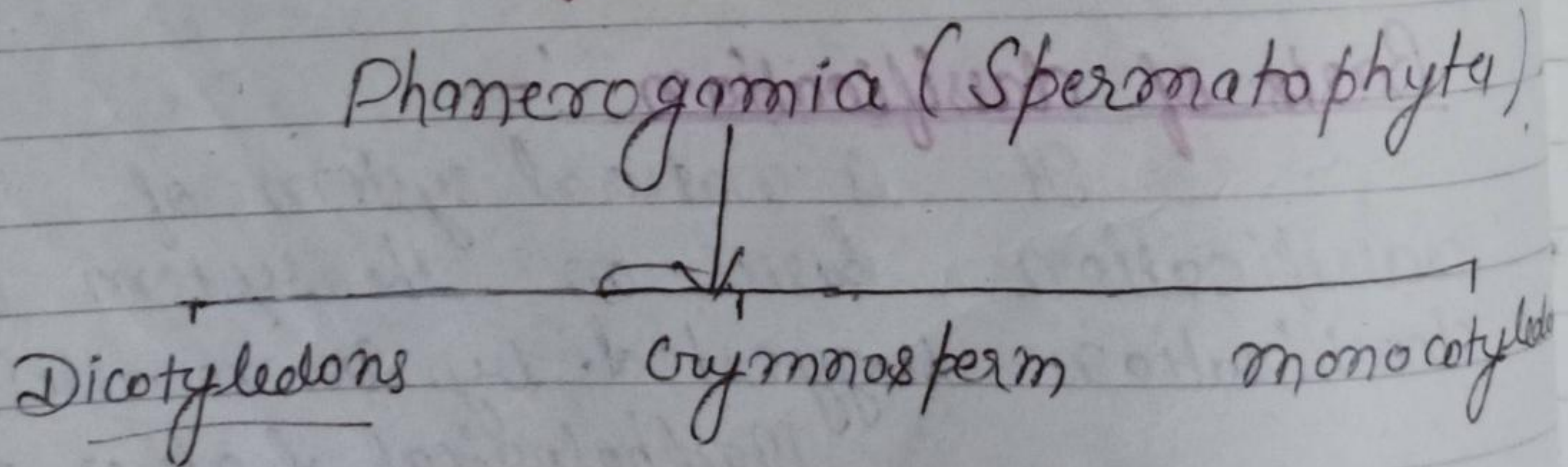
### Classification in details —

In this classification Bentham and Hooker's divided the seed plants into three major classes (groups), called Dicotyledons, Gymnosperm and monocotyledons. The dicotyledon have been divided into three sub class namely —

- (I) Polypetalae
- (II) Crumopetalae
- (III) Monochlamydeae

Each group bear a number of series which have been again divided into order and families. Respectively monocotyledon have been divided into seven and many families.

The following is the summary of Bentham & Hooker system —



Dicotyledons ! — Divided into three sub classes

- (a) Polypetalae
- (b) Crumopetale
- (c) Monochlamydeae.

Seed class

1) Polypetalae - Divided into three series.

- (a) Thalamiflorae - 6 orders - 34 families
- (b) Disciflorae - 4 orders - 23 families.
- (c) Calyciflorae - 5 orders - 27 families.

2) Cronquistalae Divided into three series :-

- (a) Inferae - 3 orders - 9 families.
- (b) Heteromerae - 3 orders - 12 families.
- (c) Bicarpellate - 4 orders - 24 families.

Monochlamydeae

3) Monocotyledon Divided into 8 series

- (a) Curvembryeae - 7 families.
- (b) Multivalvatae Adelticae - 1 families.
- (c) Multivalvatae terrestres - 3 families.
- (d) Microembryeae - 4 families.
- (e) Daphnales - 5 families.
- (f) Achlamydosporae - 3 families.
- (g) Unisexuales - 9 families.
- (h) Ordines anormales - 4 families.

Gymnospermae Divided into three orders :-

- (a) Gnetales
- (b) Coniferae
- (c) Cycadales.

Monocotyledons Divided into 7 series:—

(a) Microspermae	—	3	families
(b) Epigymaeae	—	7	families
(c) Coronarieae	—	8	families
(d) Calycinae	—	3	families
(e) Nerdiflorae	—	5	families
(f) Apocarpaeae	—	3	families
(h) Creumaceae	—	5	families

28 orders — 199 families

A synopsis of Bentham and Hooker system of classification.

Class	Sub-class	Series	Order	families	genera	Sp.
Dicotyledon	Polypetalae	3	15	84	2610	3184
	Gramopetalae	3	10	45	2619	3455
	Monochlamydeae	8		36	801	1178
			3		44	41
Gymnosperm						
Monocotyledon		7		34	1495	1857
	Total.	21	28	199	7569	9720

Class

(1) Dicotyledons — Characters

- (1) Embryo with two cotyledons.
- (2) Tap-root system.
- (3) Vascular bundles in ring.
- (4) Vascular bundle open.
- (5) Reticulate venation in leaves.
- (6) Pentamerous flowers.

It includes 14 species, 15 orders, 165 families, 6030 genera and 78214 species. It divided into three sub-class.

(1) Polypetalae (ii) Gamopetalae (iii) Monochlamy-  
-dae.

(1) Sub-class - polypetalae - Petals free. It include 15 orders & 84 families. It has been divided into three series.

(a) Thalamiflorae (b) Disciflorae (c) Calyciflorae.

(a) Thalamiflorae - In this series petals and stamens both hypogynous. It begin with family Rosaceae orders - Rosales which are most primitive family - Umbellales of the order Malvales. It include 6 orders and 34 families

(b) Disciflorae: - The series is characterised by a cushion shaped disc below of the ovary. It include 4 orders, 23 families. This series begins with lineae of the order - Geraniales and end in Moringaceae of the order Sapindales.

(c) Calyciflorae: - In this series petals and stamens perigynous or sometimes epigynous. It include 5 order and 27 families. It begins with family Compositae of the order Rosales are the most primitive and end with most advanced family - Cornaceae.

The order - umbellales.

1) Sub-class - **Cromopetalae** - Petals united. It has got three series.

(I) **Inferae** (II) **Heteromerae** (III) **Bicarpellate**

(I) **Inferae** - Ovary inferior. It includes 3 orders and 9 families. The series begins with family - **Caprifoliaceae** of the order **Rubiales** and ends with family **Compositaceae** of the order **Compositales**.

(II) **Heteromerae** - Ovary superior, carpels more than two. It includes 3 orders and 12 families. It begins with **Ericaceae** of the order **Ericales** which are the most primitive and climax family - **Ebenaceae** of the order **Ebenales**.

(III) **Bicarpellate** - Ovary superior, carpel-two. It includes 4 orders, 24 families. This series begins with most primitive family **Crotonaceae** of the order **Crotonales** and ends with most advanced family **Plantaginaceae** of the order **Plantaginales**.

3) Subclass 3 - **Monochlamydeae**.

This group is characterised by presence of paranth. It includes 8 species.

and 36 families. This series starting from  
 crumbearyae including primitive family —  
 Myctagoneae and end orders asomae.  
 including most advanced family  
 Ceratophylleae.

### Class 2 - Gymnospermae —

#### Characters: —

- (i) Shrubs or trees.
  - (ii) Stem with central pith vascular bundle ring  
and secondary growth due to cambium.
  - (iii) leaves needle like or scaly.
  - (iv) Flowers in cones spikes or clusters.
  - (v) Unisexual.
  - (vi) Ovules naked not enclosed in ovary.
- It includes 3 orders  
 (a) Gnetales (b) Coniferales (c) Gymnadales.

### Class - 3 Monocotyledons —

#### Characters: —

- (i) Embryo with one cotyledon.
  - (ii) Fibrous root system.
  - (iii) Parallel venation and isobilateral leaf
  - (iv) Vascular bundle scattered.
  - (v) Vascular bundle closed.
- It divided into 7 series  
 34 families. The series starting from  
 microspermae including Primi Arey

Hydrocharitaceae petaloid inner perianth and inner ovary and end with Crumaceae including most advanced family Compositae. In this family perianth are much reduced or loss of perianth is indicate of advanced nature.

### Merits of classification.

- 1) The system is a natural one and has been found suitable for practical purpose.
- 2) The system starts with the Ranales which are now universally considered to be the most primitive living angiosperm.
- 3) The placing of gamopetalae after polypetae is justified since union of petals is considered to be an advanced feature over the free condition.
- 4) The polypetalae include thalomiclorae and calyciflorae of de Candolle. But Bentham and Hooker distinguished a new series Disciflorae which include orders which can be assigned to thalomiclorae or calyciflorae.
- 5) In gamopetalae the position of heteromeral before bicarpetalae is justified.

Treating cucurbitaceae and umbelliferae the end of polypetalae as conducting



links.

- (vii) Among monochlamydeae families with unisexual flowers (Forsythaceae, Euphorbiaceae) are placed after the families having bisexual flowers.
- (viii) Inclusion of disputed families among ordines anomala.
- (ix) Placing of unisexual monocot families after liliaceae.
- (x) The series Clemaceae which is having extremely reduced flowers and inflorescence may be justified in occupying the last position at the end of the flowering plants.

### DEMERITS.

- (i) The Gymnosperms are wrongly placed between dicots and monocots.
- (ii) In dicots Euphorbiaceae was placed in monochlamydeae through related to malvaceae.
- (iii) Compositae which is a highly advanced family is placed in inferae at the beginning of Gamopetalae.
- (iv) Chenopodiaceae and Caryophyllaceae are kept separately among dicots.
- (v) Advanced families like Orchidaceae and Scitamineae are treated in the beginning of monocots.
- (vi) The typical hypogynous family liliaceae

which should have been in the beginning is placed in the third series of monocots (Compositae).

(vi) Liliaceae and Amaryllidaceae were kept apart though they are very closely related.

(vii) Grisebaceae and Amaryllidaceae are more akin to Liliaceae than Scitamineae or Bromeliaceae with which they are associated through epigealous flowers.

(ix) Ternstroemiaceae which is connected with palmaceae should be drawn nearer to Liliaceae.

(x) From the use of terminology of different ranks of taxa there is no uniformity.