

Course : B.Sc. Botany Honours (part II)

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Taxonomy

History of taxonomy & Systems of classification

Taxonomy is the science which deals with the study, identification, nomenclature and systematic arrangement of living organisms. When the study is related to plants, it is called plant taxonomy. Similarly animal taxonomy deals with the classification of animals. The word taxonomy has its origin from the Greek word taxis meaning arrangement; nomous means name. Hence, the plant taxonomy may be defined as the study of principles and practices of classification of plants and their relationships. History of plant taxonomy is divided into different periods on the basis of the principles adopted during the periods.

Period I Classification based on habit :

Such systems of classification were associated with the beginning of the taxonomy. These were prevalent from 300 B.C. to almost the middle of the eighteenth century. Such systems were propounded by the Greek herbalists and botanists and were based on habit of plants. They were only crude systems, but were in practice and accepted ones.

Theophrastus (370-285 B.C.)

History of plant classification dates back to the period of **Theophrastus**, who is also known as the father of botany. He was pupil of the great Greek philosopher **Aristotle**. Theophrastus was a Greek naturalist, described 480 plants in his book *Historia Plantarum*. He classified plants for convenience into four groups namely, herbs, undershrubs, shrubs and trees. Small, delicate plants were grouped under herbs, smaller size bushy woody plants were brought under undershrubs and shrubs depending on their relative sizes and large woody plants with main stem with branches at the top were grouped under trees. He pointed out the fundamental differences between Dicotyledons and monocotyledons.

Peanion Dioscorides (62-128 A.D.) – He explained about 600 plants of medicinal importance. He recorded his work in his book “*Materia Medica*” in Greek language.

Albertus Magnus (1193-1280) - He recognised the difference between the Dicotyledons and monocotyledon plants. He described plants and practical methods of gardening in his book “*De vegetabilis*”. His work was followed till the next 200 years not only by the botanists, but also by the common people due to its practicability.

Otto Brunfels (1464-1534) - He was a German teacher and physician and was one of the first group of herbalists who gave a consolidated account of plants, known at that time. He was interested in the medicinal values of plants and their domestic uses. He first recognised the *Perfecti* and *Imperfecti* group of plants based on the presence and absence of flowers respectively.

Jerome Bock (1498-1554) - A German school teacher, then a minister and a physician was interested in plants and studied botany only as a hobby. He classified plants into trees, shrubs and herbs and tried to bring plants of similar habits and affinities together. He is also known as the second of the "German Fathers of Botany "

Andrea Caesalpino (1519-1603)- He was an Italian physician and a botanist. He authored a book "*De Plantis*" (1583). There was description of over 1500 plant species, which were classified under two major groups- woody and herbaceous habit. He also recognised the characters of fruit, seed and embryo in his groups.

J. Bauhin (1541-1613)- French physician who wrote "*Historia Plantarum Universalis*", which was published posthumously in 1650-51 in 3 volumes.

G. Bauhin (1560-1624)- Described plants in his twelve books "*Prodromus Theatri Botanici* (1620) and *Pinax Theatri Botanici* (1623)". The *Pinax* consisted of description of about 6000 plant species. He was the first person to find out the binomial nomenclature although it is credited to a Swedish botanist **Carolus Linnaeus**, who brought it into practice in his *Species plantarum*

John Ray (1628-1705)- A British naturalist recognised two major groups in angiosperms on the basis of habit and other morphological and few anatomical characters. He wrote the book "*Historia Plantarum*". His broad classification was as follows :

A. Herbae --Herbaceous plants

(i) Imperfectae (Flowerless plants)

(ii) Perfectae (Flowering plants)

(a) Dicotyledones (seed with two cotyledons)

(b) Monocotyledones (seed with single cotyledon)

B. Arbores—Tree habit

(i) Dicotyledones

(ii) Monocotyledones

J.P. Tournefort (1656-1708)- Published *Elements de Botanique* in 1694, which was translated into Latin and published in the year 1700 in three volumes. He is called as the founder of modern genera.

He took floral characters in consideration for the purpose of classification, besides habit. However, his classification lacked distinction in Phanerogams and Cryptogams and also between monocots and dicots.

Period II

Artificial systems based on numerical classification

These systems were designed to help in identification of plants. Since, there was very least knowledge of characters of plants and the systematists did not follow the classification of form that

was prevalent since the time of Aristotle. A new classification was proposed by a Swedish botanist **Carolus Linnaeus**, whose classification gained popularity at that period

Carolus Linnaeus (1707-1778) – He is still widely known botanist of modern times. He was a Swedish physician, professor of practical medicine as well as a botanist .He is also known as the father of taxonomic botany and zoology. He published a number of papers such as *Genera Plantarum*, *Flora laponica*, *Species Plantarum* etc. In which he has described all the plant species known that time.

Besides all this, Linnaeus proposed what is known as the *sexual system of classification*. In his system all plants including lower plants were divided into 24 classes on the basis of number, union, length, and certain obvious characters of the stamens. However, this is not fit for the lower plants which bear no flowers. An outline of his classification is stated below :

Class 1. Monandria- flowers with single stamen

2. Diandria- 2 stamens
3. Triandria- 3 stamens
4. Tetrandria- 4 stamens
5. Pentandria- 5 stamens
6. Hexandria- 6 stamens
7. Heptandria- 7 stamens
8. Octandria- 8 stamens
9. Enneandria- 9 stamens
10. Decandria- 10 stamens
11. Dodecandria- 11-19 stamens
12. Icosandria- More than 19 stamens attached to the calyx
13. Polyandria- More than 19 stamens attached to the receptacle
14. Didynamia- Stamens didynamous i.e. 2 longer and 2 shorter stamens
15. Tetrodynamia- Tetrodynamous stamens i.e. 4 longer and 2 shorter.
16. Monadelphia- Stamens arranged in one bundle
17. Diadelphia- Stamens in two bundles
18. Polyadelphia- Stamens in many bundles
19. Syngenesia- Stamens syngenesious i.e. all the anthers united but with free filaments
20. Gynandria- Stamens adnate to the pistil

21. Monoecia- Plants monoecious i.e. both the male and female flowers on the same plant

22. Dioecia- Plants dioecious i.e. Male and female flowers are borne on separate plants and distinguished as male and female plants respectively.

23. Polygamia- Plants polygamous

24. Cryptogamia- Plants with hidden flowers (Flowerless plants)

Linnaeus's system was artificial, but due to its simplicity and easy way for identification of plants, it persisted for nearly hundred years in spite of many shortcomings. He was fully aware of its shortcomings and he considered it as a makeshift arrangement to deal with a large number of plants. He is regarded as a reformer in the field of taxonomy. He is known as propounder of **binomial system of nomenclature**, which is being followed till date. He introduced the precision to the art of description and nomenclature of species. By 1760 his system was adopted widely in the European countries namely Germany, Holland and England.

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