

# **M.Sc. Botany (Semester II)**

**Course Title : Systematics and Evolution**

## **Unit I: History of developments in taxonomy**

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# Pre-Linnaean taxonomy

- **Earliest taxonomy**
- **The Greeks and Romans**
- **The Herbalists**
- **Early taxonomists**

## Earliest Taxonomy

- Folk taxonomy, which is of great importance in ethnobiological studies
- Ancient taxonomy usually mean the history in the Western world, starting with Romans and Greek. However, the earliest traces are not from the West, but from the East
- Eastern taxonomic works were not known to the Western world until the Middle Ages and could thus not influence the progress of Western sciences.

- Earliest pharmacopoeias was written by **Shen Nung**, Emperor of China around 3000 BC.
- **“Father of Chinese Medicine”**
- Introduced **acupuncture**. He wanted to educate his people in agriculture and medicine
- The pharmacopoeia Divine Husbandman's Materia Medica included 365 medicines derived from minerals, plants, and animals.
- Around 1500 BC medicinal plants were illustrated on wall paintings in Egypt. The paintings gives us knowledge about medicinal plants



# The Greeks and Romans

**Aristotle (384–322 BC)** The Greek philosopher Aristotle was the first to classify all living things, specially on animals (vertebrates and invertebrates)

**Theophrastus (370–285 BC)** Student of Aristotle and Plato. Wrote a classification of all known plants, *De Historia Plantarum*, which contained 480 species.

**Dioscorides (40–90 AD)** wrote *De Materia Medica*, which contained around 600 species. The classification in his work is based on the medicinal properties of the species.

**Plinius (23–79 AD)** wrote book *Naturalis Historia*, a work of 16 volumes, described several plants and gave them Latin names.

# The Herbalists

- This was the time of the different herbals written by herbalists like **Brunfels, Bock, Fuchs, Mattioli, Turner, L'Obel, Gerard, L'Ecluse**
- With time the herbals became more and more original with more elaborate woodcuts as illustrations.

## Early taxonomists

- Andrea Caesalpino (1519–1603) Italian Scientist, called as "the first taxonomist".
  - In 1583 he wrote De Plantis
  - Worked on 1500 species
  - Classification based on growth habit together with fruit and seed form



- **Gaspard or Caspard Bauhin (Swiss Scientists)**
- Wrote the book **Pinax Theatri Botanici** in **1623**, work is a listing of **6000 species**
- The Bauhin brothers included synonymes
- Recognized genera and species as major taxonomic levels.





## John Ray (1627–1705), English naturalist

- Establishment of species as the ultimate unit of taxonomy
- In 1682, published **Methodus Plantarum Nova**, which contained around 18 000 plant species
- Classification was based on many combined characters

## Joseph Pitton de Tournefort (1656–1708)

- French Scientist
- Constructed a botanical classification that came to rule in botanical taxonomy
- In 1700, published *Institutiones Rei Herbariae*, in which around 9000 species were listed
- Primary emphasis on the classification of genera, and many genera were accepted by Linnaeus
- Classification was based on floral characters

## Linnaean era

- **Starting point of modern taxonomy**
- **Transforming botany and zoology into a science**

# Starting point of modern taxonomy



- **Carl Linnaeus (1707–1778 ) Swedish Scientist,** are regarded as the starting points of modern botanical and zoological taxonomy
- The **global flora *Species Plantarum*, published in 1753** and **10<sup>th</sup> edition of *Systema Naturae* in 1758** including **global fauna**
- Linnaeus introduced "**trivial names**" for both plants and animals. The trivial names were intended for fieldwork and education
- Linnaeus counted 8530 species of flowering plants in 1753.

# Transforming botany and zoology into a science

- Carl Linnaeus started his career by publishing in 1735 called ***Systema Naturae*** (all living things)
- Introduced the sexual system of plants, an artificial classification based on the sexual parts of the flower (stamens and pistils)
- Linnaeus published several books that would transform botany and zoology into sciences

- In 1735, he published ***Critica botanica***, with rules for the formulation of generic names
- In 1735, ***Genera Plantarum*** with a list of all known genera
- In 1736, ***Fundamental botanica*** and ***Philosophia botanica*** in 1751, created rules for species descriptions, terminology, and even instructions on how to build a proper herbarium
- Terms created like corolla, stamen, filament, anther, mammalia.
- He give the foundation for botany and zoology, and it was now time for subsequent taxonomists to improve this newborn science.

# Post-Linnaean taxonomy

- **Natural system emerging in France**
- **Rules for nomenclature**
- **From phenetics to phylogenies**
- **The Phylocode**

## Natural system emerging in France

- **Georges-Luise Leclerc de Buffon (1707–1788):**

His theories touched upon development of species, infraspecific variety & acquired inherited characters in species

- **Michel Adanson (1727–1806)**

- wrote Familles des Plantes in 1763

- The idea that in classification one should not put greater emphasis on some characters than on others, but use a great range of characters



- **Antoine Laurent de Jussieu (1748–1836)**

- Changed the system of plants with *Genera Plantarum* in 1789,
- A natural system based on many characters that came to be a foundation of modern classification. He divided the plants into acotyledons, monocotyledons and dicotyledons

- **Jean-Baptiste de Lamarck (1744–1829)**

launched an evolutionary theory including inheritance of acquired characters, named the "Lamarckism"

# Phenetics to phylogenies

- **Charles Darwin (1809–1882) and Alfred Russel Wallace (1823–1913)** launched the **evolutionary theory** in 1858
- **German biologists, Ernst Haeckel (1834–1919) and August Wilhelm Eichler (1839–18878)** the construction of evolutionary trees
- **Haeckel** proposed the term "**phylogeny**".

In the 20<sup>th</sup> century was dominated by extended phenetics, i.e. looking for similarities and differences to create systematics

# PhyloCode

- The PhyloCode reflects a philosophical shift from naming species and subsequently classifying them (i.e., into higher taxa) to naming both species and clades.
- The main idea with the PhyloCode is that only species and clades should have names, and that all ranks above species are excluded from nomenclature.

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- Pandey BP (2010) A Textbook of Botany: Angiosperms. S. Chand & Co. Ltd. (ISBN: 9788121904049, 9788121904049)
- <https://en.wikipedia.org/wiki/Poaceae>
- I apologize to all authors whose findings could not be substantiated or cited in our presentation due to reasons of brevity

**Thank you for your attention**

