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
• 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
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 160 voulmes, 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
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 10th 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.
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"
• Charles Darwin (1809–1822) 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 20th century was dominated by extended phenetics, i.e. looking for similarities and differences to create systematics
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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• 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