

Chapter 2

The Development of Taxonomy

2.1. Inception of taxonomic thinking

- The **history of taxonomy** dates back to the **origin of human beings**
- Taxonomy is as old as **the language skill of mankind**
- Ancient people classified plants as **edible, non-edible, Poisonous, medicinal** etc...in order to communicate acquired experiences to other members of a family
- Ancient people were able to classify **Fruits and berries, poisonous and edible mushrooms, game birds and mammals, of poisonous and non-poisonous snakes** traditionally

Inception of taxonomic thinking contd..

- **Taxonomy** is also known as man's oldest profession.
- Ancient **classification was coupled with Identification and naming, through this act, taxonomic thinking** smoothly entered to the scene

2.2. Folk taxonomy

- Ancient people had **some system of classification of organisms** to convey the properties and uses of organisms
- **Folk-taxonomy** or classification, was practiced **by communities** (primitive and civilized), **with out the influence** of science.
- Folk taxonomy gave a common name **legume** for most members of the family **Fabaceae**, **grass** for all **Poaceae** and **Sedge** largely covering members of **Cyperaceae**.

2.3. Practice by Greek and Roman Philosophers

Aristotle (384–322 BC)

- In **Western scientific taxonomy** the Greek philosopher **Aristotle** was the first to classify all living things.
- Some of **his classification** are still used today, like the **vertebrates and invertebrates**, which he called animals **with blood and without blood**.
- He further divided the **animals with blood into live-bearing and egg-bearing**, and formed **groups within the animals without blood** that we recognize today, such as **insects, crustacea and testacea (molluscs)**.

Practice by Greek and Roman Philosophers....

Theophrastus (370–285 BC)

- Was a **student of Aristotle and Plato**.
- He wrote a classification of all known plants on his book *De Historia Plantarum*, which contained **480 taxa**.
- His classification was based on **growth form/growth morphology**
- Theophrastus **grouped his taxa into trees, shrubs, subshrubs, and herbs**

Practice by Greek and Roman Philosophers....

- **Theophrastus** even classified his taxa by looking the difference in ovary position, **superior or inferior**, **sepal free or fused**, internal anatomy and fruit types.
- Science still recognises many of Theophrastus plant genera, like *Narcissus*, *Crocus* and *Cornus*.
- This is because **Carl Linnaeus** accepted many of his **generic names**.
- *De Historia Plantarum* was used for taxonomic purposes until the Middle Ages in Europe.

Practice by Greek and Roman Philosophers....

Dioscorides (40–90 AD)

- Was a **Greek physician**, who travelled widely in the Roman and Greek world to gather knowledge **about medicinal plants**.
- Between **50-70 AD** he wrote his **book *De Materia Medica***, which contained **around 600 taxa**.
- ***De Materia Medica*** was used in medicine **until the 16th century**, and was copied several times.
- The classification in his work is based on the **medicinal properties of the species**.

Practice by Greek and Roman Philosophers....

Plinius (23–79 AD)

- Was involved in the **Roman army** and later in the Roman state.
- He wrote **many books**, but the only one that has survived is his *Naturalis Historia*, a work of **160 volumes**, in which he **described several plants** and **gave them Latin names**.
- Many of these names are still recognized, such as *Populus alba* and *Populus nigra*

Practice by Greek and Roman Philosophers....

- Since Latin was later kept for botanical science, we may call Plinius the Father of Botanical Latin.

2. 4.The Herbalists

- The time of Herbalists was known by the study of plants for their use to humans, mainly as foods and medicine.
- The phase was known during the sixteenth century
- This was the time at which different herbals written by herbalists like Brunfels, Bock, Fuchs, Mattioli, Turner, L'Obel, Gerard, L'Ecluse.
- We recognize some of these authors in beautiful plants later named by Linnaeus in honour of them: *Brunfelsia*, *Mattiolia*, *Turnera*, *Lobelia*, *Gerardinia* and *Fuchsia*.

The Herbalists contd..

- There was not much of a classification in the herbals, and the earliest works were merely copying Theophrastos and Dioscorides.
- With time the **herbals became more and more original** with more elaborate woodcuts as illustrations.
- Herbalists were not only use original text but also of **original illustration drawn from nature.**

2.5. Early taxonomists

- It was not until the **end of the 16th century** that taxonomic works **became original** enough to **replace the ancient Greek works**.
- One of the reasons for this was the **development of optic lenses**, which made it possible to **study details** in the different species.
- Collection of specimens became part of the growing sciences, and the **emphasis turned from medical aspects to taxonomic aspects**.

Early taxonomists contd...

Caesalpino (1519–1603)

- One of the earliest authors recognised among Early taxonomists was **Caesalpino (1519–1603)** in Italy.
- Caesalpino is sometimes called "**the first taxonomist**".
- In 1583 he wrote his book ***De Plantis***, a work that contained **1500 species**.
- His classification was based on **growth habit** together with fruit and seed form, as was that of Theophrastos.
- Some groups that he recognized are still acknowledged, like the plant families **Brassicaceae and Asteraceae**.

Early taxonomists contd...

J. Bauhin and G. Bauhin (1541–1631; 1560–1624)

- Two Swiss brothers **wrote the book *Pinax Theatri Botanici* in 1623.**
- The word ***Pinax* means register**, and the work is a listing of **6000 species**.
- *The Bauhin brothers included synonyms*, which was a great necessity of the time.
- By this time, **species were known with many different names** in different books, and *Pinax Theatri Botanici* made a welcome order in the taxonomic world.
- The Bauhin brothers **recognized genera and species as major taxonomic levels.**

Early taxonomists contd...

John Ray (1627–1705)

- An English naturalist who wrote several important works in his life.
- His most important contribution was the **establishment of species as the ultimate unit of taxonomy**
- In 1682, he published *Methodus Plantarum Nova*, which contained around **18 000 plant species**, a result of a relatively narrow species concept.
- His complicated **classification** was **based on many combined characters**, as opposed to the other earlier taxonomists.
- Ray aimed at publishing a **complete system of nature**, which included **works on mammals, reptiles, birds, fishes and insects**, the latter including **pioneering entomological taxonomic work**.

Early taxonomists contd...

Joseph Pitton de Tournefort (1656–1708)

- A French botanist who constructed a **botanical classification** that came to rule in **botanical taxonomy** until the time of Carl Linnaeus.
- In 1700 , he published *Institutiones Rei Herbariae*, in which around 9000 species were listed in **698 genera**.
- He put primary emphasis on the **classification of genera**, and many genera were **accepted by Linnaeus and still in use today**.
- Tournefort's plant classification was exclusively based on **floral characters**.

Early taxonomists contd...

- Tournefort's system was the one used by Linnaeus while Linnaeus was a young student, Tournefort denied the presence of sexuality in plants, **Linnaeus on the contrary based his system on that argument.**

2.6. Linnaeus and his students

- The Swede, taxonomist, Carl Linne (usually Latinized as **Carolus Linnaeus, 1707-1778**) was the **founder of modern taxonomy for both plants and animals** that we employed today.
- Mainly he **grouped plants and animals following artificial system** (observing very few characters) mostly **their sexual organs**.
- His published books ***Genera Plantarum* (1737)** and ***Species Plantarum* (1753)** and ***Systema Naturae* (1758)** are the most important ones and most useful that we are using today.

Linnaeus

- His era is termed as **the Linnaean era** and indeed the **starting point of** modern taxonomy
- For nomenclatural reasons two works of **Carl Linnaeus (1707–1778)** are regarded as the **starting points of modern botanical and zoological taxonomy**: the global flora *Species Plantarum*, published in 1753 and the tenth edition of *Systema Naturae* in 1758 including *global fauna*.

Linnaeus

- The reason for this is that **Linnaeus introduced in these books a binary form of species names for both plants and animals.**
- For each species he created an **epithet that could be used together with the genus name.**
- The names were intended for **fieldwork and education, and not to replace the earlier phrase names.**
- The **phrase names** included a **description of the species that distinguished it from other known species** in the genus.

Linnaeus

- With an **expanded knowledge of the global fauna and flora** through 17th and 18th century scientific expeditions, a large number of **new species were found and named**, and **more terms were added** to each phrase name.
- By the **time of Linnaeus** the situation was really bad.
- Linnaeus counted **8530 species of flowering plants in 1753**.

Linnaeus

- The simplicity of Linnaeus' **trivial names revolutionized nomenclature**, and soon **binary nomenclature** came to replace the phrase names.
- Today, **every plant or animal name published before 1753 or 1758**, respectively, is called "**prelinnaean**" and is thus **not valid**.

Linnaeus contd...

Transforming botany and zoology into a science

- Carl Linnaeus started his career by publishing a system of all living things and minerals in 1735 called *Systema Naturae*.
- In this book he introduced the sexual system of plants, an artificial classification based on the sexual parts of the flower: the stamens and pistils.
- In a time when people debated whether plants had sexuality or not, this suggestion from an unknown person not belonging to any classical European school of natural sciences more or less shocked the scientific world.

Linnaeus contd...

- However, the practical use of the system and Linnaeus careful observations persuaded the critics and **Linnaeus sexual system of plants became the highest fashion** also outside the scientific community.
- In an attempt to make order in the world of taxonomy and explain his way of thinking, **Linnaeus published several books that transformed botany and zoology into sciences of their own.**

Linnaeus contd...

- Until then, these two disciplines had **merely been a fringe of practical medicine** built on scattered observation of different species
- *With the works of Linnaeus, botany and zoology transformed into a **Scientia**, a science surrounded by **philosophy, order and systems**, just like the disciplines of theology, philosophy and law.*

Linnaeus contd...

Some main books of Linnaeus

- In 1735 he published *Critica botanica*, with rules for the formulation of generic names.
- In the same year came *Genera Plantarum* with a list of all known genera.
- In subsequent books like *Fundamenta botanica* in 1736 and *Philosophia botanica* in 1751 he created rules for species descriptions, terminology, and even instructions on how to build a proper herbarium cupboard.

Linnaeus contd...

- Linnaeus established many of the rules taxonomists use today.
- Terms like *Corolla*, *Stamen*, *Filament* and *Anther* were created by him, as well as well-known taxon names like *Mammalia*.
- After a long life with a massive publication in the philosophy and practicality of systematics, Linnaeus had laid out the foundation for botany and zoology, and it was then time for subsequent taxonomists to improve his newborn science.

2.7 Post-Linnaean Natural system

- Linnaeus classification system was **famous and adopted** because it was easy.
- The foundation of the **modern families** came mainly from the work of **French taxonomists** in the eighteenth century, **M. Adanson** (1727-1806), **A. L. de Jussieu** (1748-1836) and **J. de Lamarck** (1744-1829), who **never followed the sexual system**.

Post-Linnaean contd....

- Adanson produced his book *Families de plants* in **1763** and today he is **most remembered for championing the idea that in classification one should use a great range of characters covering all aspects of an organism**, and without placing greater emphasis on some than others.
- The **French taxonomists scientific work**, the **development of anatomy and physiology** and **development of new and improved optical instruments** made way for a new era of taxonomy, which was **trying to cope with an increasing number of species** in a **rapidly expanding flora and fauna of the world**.

CHAPTER 3

Classification System

Will be online very soon