

Carl von Linné – the Father of Taxonomy

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Every student of undergraduate Botany classes has a problem of remembering scientific names of plants and on top of it, the name changes. One day students learnt a name for a particular plant e.g. *Ocimum sanctum* L. for Tulsi with great difficulty and after a few years surprisingly teacher in the taxonomy class says that the correct scientific name for Tulsi is *Ocimum tenuiflorum* L. Isn't it confusing? In addition, they are expected to remember so many such difficult names of plants for the examination. At that time one wonders who the person responsible for all these confusions is. And, let me tell you the main culprit is none other than Carl Linnaeus.

Looking back, it is found that there was a big confusion in his own Swedish name of this great naturalist. He was known in the name of *Carolus Linnaeus*, *Carl Linnae*, *Carl Linnaeus*, *Carl von Linné*, etc. But he used the Latinized form of his name "*Carolus Linnaeus*" the most when he published his scientific works in Latin.

His surname *Linnaeus* is also an adopted one. Carl's paternal grandfather like most of the Swedish peasants of his time had no surname. When his father Nil Ingemarsson went to the University of Lund, he had to provide himself with a surname for registration purpose. He then invented the name "Linnaeus" with reference to a large and ancient tree of small leaved "Linden" (*Tilia cordata* Miller = *T. europea* L.) known in Småland dialect as "Linn" which grew on the family property known in the 17th century as Linnegard. After his return from Lund, other branches of his family took the surnames Linelius & Tiliander from the same old tree.

Parents of Linnaeus were married in 1705 and Carl was born on the farm Råshult, located in Almhult Municipality, in the province of Småland in southern Sweden, on May 23, 1707. His father was Nils Linnaeus, 1674 – 1748, came from a family of farmers and clergymen. Carl's mother Christina, 1688-1733, was the daughter of Samuel Brodersonius who preceded Nils Linnaeus as Vicar of Stenbrohult. Christina's mother was burned as a witch in 1622. Carl got two sisters Anna Maria and Sophia Juliana and a brother,

In 1717 Carl was sent to the primary school at Vaxjo, and in 1724 he passed to the gymnasium there, but with meager results in the clerical faculty. Instead his interest in plants made him famous in school as 'little botanicus' and at the age of five Carl got his own garden to take care of. This



Fig. 1: The Linn tree – source of the surname *Linnaeus*.

2 Carl von Linné

had made impression on a local physician, realizing there might be a bright future in the field for Carl, and on his recommendation Carl's father sent him to study medicine at the nearest university, Lund University in 1727. He tried to make something of the botanical garden of Lund that was very much neglected and was in bad shape. Realising, Carl's financial problems Dr. Rothman suggested him that he would have better prospects at the University of Uppsala. So, Carl left for Uppsala within a year in 1728.

At Uppsala University Carl was admitted as a student without means and at the beginning, he was financially rough, until he was acquainted with the renowned scientist Prof. Olof Celsius in 1729. Celsius, impressed with Linnaeus's knowledge and botanical collections, helped him financially and board and lodge in his house for some time. Later on Celsius arranged his stay in the house of Prof. Olof Rudbeck Jr in exchange of tutoring Rudbeck's three sons.

In 1732, Carl took a break from studies for his first scientific expedition. After arguing that the knowledge gained from a trip to Lapland could benefit Sweden's economic and security interest, he received a grant from the Royal Academy of Sciences at Uppsala for an expedition to Lapland in northernmost Sweden, then virtually unknown. The result of this was first published in *The Florula Lapponica* (the first work to use the Sexual System) and later in the *Flora Lapponica* published in 1737. His journey to sub-Arctic Lapland is notable for exotic and adventurous episodes.

During this period, he came upon a work which ultimately led him to the establishment of his artificial system of plant classification. This was a review of Sebastien Vallient's *Sermo de Structura Florum* (Leiden 1718), a thin quarto in French and Latin. Through this, he became convinced of the importance of the stamens and pistils, on which he in 1729 wrote a short treatise on the sexes of plants. It caught the attention of Olof Rudbeck the younger (1660-1740), the professor of botany in the university, who subsequently appointed him as his adjunct. In 1730, Carl began giving lectures in the faculty.

Linnaeus' reputation was spread in the Netherlands. In autumn 1735, director of Dutch East India Company Georg Clifford, persuaded Linnaeus to start working for him. At his country house Hartecamp he had founded a botanical and zoological centre. Linnaeus accepted and stayed with Clifford. During his two years stay, Linnaeus used the time efficiently and traveled to botanical gardens in Holland to obtain plants for Clifford's garden. Soon Linnaeus wrote a book about Hartecamp "*Hortus Cliffortianus*" where he points out that the garden was "Nature's masterpiece, strengthened by Art" and that there were "avenues, flowerbeds, statues, ponds and artificial hills and labyrinths". The zoological part was full of "tigers, apes, wild dogs, Indian deer and goats, South American and African pigs". Moreover there were masses of birds, "the garden echoing with their cries." In the hothouse were so many strange plants that, wrote Linnaeus, "I was astounded when I entered the conservatories so full of manifold plants that a son of the North must feel enchanted and confused as to which foreign part of the world he had been transported to". He also published *Genera plantarum* and *Flora Lapponica*.

Linnaeus devised a comprehensive system of classification for all animals, plants and minerals, which he published in *Systema naturae* in 1735. He classified all the then known plants according to a simple system by which they could be easily identified, and to provide for each a name of only two words. Linnaeus divided the plant kingdom into 24 classes based on the number and disposition (nature) of stamens and 67 orders, based on the number and disposition of pistils. This was not accepted by many at first as they were searching for a natural classification, and Linnaeus's scheme was artificial, grouping plants by what seemed to be arbitrarily chosen characters. Professor Johan Jacob Dillenius first accused Linnaeus for putting "*the whole botany in disorder*" but again appreciated the method when the later successfully demonstrated the advantages. In fact, Linnaeus's lasting fame rests not on his classification itself but on his contribution in nomenclature and description and on his having provided a comprehensive and effective information system for growing knowledge about the world's biota.

His zoological classification system – a six class system, is partly based on single organ characters, such as mammalian teeth, avian bills, and piscine fins. These have been modified today. But, his treatment of insecta, which he based on wing types, still essentially valid today. – In fact, he edited the work of his

deceased friend Pehr Artedi entitled *Ichthyologia Sive Opera Omnia de Piscibus* and published in Leiden in 1738. Just before his journey to Öland and Gotland in 1741, Linnaeus had been appointed to the chair of medicine at Uppsala University.

During his days in Stockholm Linnaeus was one of the founders of the Swedish Academy of Sciences. The first meeting of the Academy was held in May 1739. The distribution of work was decided by drawing of lots and Linnaeus became the first *Praeses* of the Academy.

The binomial nomenclature did not originate with Linnaeus. Theophrastus, the father of botany, used binomials even in 4th century BC, but it was Linnaeus, who systematized the method and prepared necessary workable code of nomenclature distinguishing for the first time between species and varieties and making the species the unit of classification. These easy to remember binomials were used alongside his traditional diagnostic polynomials (which he still regarded as TRUE names of plants) eventually led to recognize the *Species Plantarum* as the starting point for modern Botanical nomenclature that was published on 1st May 1753.

In *Species Plantarum* around 9,000 plants from around the world are listed. It achieved this distinction because,

- It contained all plants then known.
- It allowed easy identification of plants by putting every genus in an artificial class and order. By counting pistils and stamens anybody, even without much knowledge of plants, was able to get a listing of genera that the plant in question should belong to.
- It gave a two part name (binary name) to every species listed, thus separating nomenclature from Taxonomy.

Naming of plants is of such international importance that it is now regulated by ICBN, which directs the procedures to be followed for determining or selecting the name of a particular plant. These terms were first fixed by Linnaeus. In a letter in 1737, he wrote: “*If you were to collect all generic names that have been changed from the time of Tournefort to this present day, they would exceed a thousand, though insensibly introduced. What is the cause of all these innovations: I can perceive no other than there having no laws laid down, by which names could either be made or defended?*”

As established by ICBN, to be considered valid, the name of an organism must be published and its description based on a specimen, if possible. In the absence of a preserved specimen, the species may be typified by a description or a figure. The *Species Plantarum* was later on revised by Carollo Ludovico Willdenow.

Throughout his life he corresponded with naturalists in distant places and received plants and animals from all corners of the globe and published around 180 books – large and small. In one of his publications – *Hortus Cliffortianus*, the front page is depicted as follows:

*In the centre of the picture a Crowned Goddess, Mother Earth, sits upon a lion that symbolizes her power; at her feet a pot of **Cliffortia ruscifolia** L., named in honor of his patron George Clifford [owner of the splendid garden at Hartecamp in Holland that provided him with a rich field of study]; she holds the keys to the garden in her hand. On the left, plants from Africa, America and Asia are brought in tribute to the Goddess; on the right is a Banana plant indicating his success in its cultivation at Hartecamp. On a pedestal behind the Goddess is a bust of Clifford garlanded with laurel, against a background of topiary. Linnaeus himself is represented by the young Apollo bring light in his right hand and casting off darkness with his left; he wears a laurel, wrath and tramples underfoot the slain dragon of falsehood.*

Over the years Linnaeus observed that the flowers open and closes at a particular time of a day and it is specific to a species. Following this, he constructed a nicely depicted Floral Clock.

Linnaeus was dubbed in 1753 by King Adolph Fredrik to **Knight** of Nordstjärneorden as the first civilian in Sweden. In 1761 he was raised to the **nobility** and took the name **von Linné**. Linné drew a

4 Carl von Linné

proposal on a coat of arms for the noble-family *von Linné*. His proposal was composed of three fields with the colors of the nature, black, green and red. Above these fields was an anatomic egg and in the helmet a *Linnaea borealis*. The national herald Daniel Tilas rejected his proposal but he later came up with a proposal that was accepted by Linné. The shield is supported by a lion and an eagle (with small shields carrying the plant symbols for England and Scotland on the lion and the shamrock of Ireland on the eagle). The whole is surmounted by a helmet bearing the plant *Linnaea borealis* and the rising sun. The motto, *Naturae Discere Mores*, means “to learn the ways of nature”.

In early February 1735 Linnaeus met **Sara Elisabeth Moræa** (16.4.1716 – 20.4.1808) at Falun and proposed her to marry. ‘Sara Lisa’ agreed but with the condition that Linnaeus should get his M.D. degree and will earn a good livelihood first. Accordingly he started his journey on February 20, 1735 and reached University of Hardevijk on 5th May same year and got his M.D., just a few days after his arrival, on 9th May (1735). For this he defended a thesis about malaria where he connected the disease with the amount of clay in the water. After a long trip in different European countries finally he returned to Sweden on June 28, 1738. Just after a short visit to his native place he went to Falun to meet Sara Lisa. Finally, the wedding was held at Moræas’ farm at Sveden in Falun on June 26, 1739. Sara was a very strict housewife. Their first child **Carl Linnaeus Jr** (20.01.1741 – 10.11.1783) later on got the father’s chair at the Uppsala University. Second child **Elisabeth Christina** (14.6.1743 – 15.4.1782) had two children. Second daughter, **Sara Magdalena**, survived for 15 days (8.9.1744 – 23.9.1744) only. Third daughter **Lovisa** (24. 12. 1749 – 24. 3. 1839) remained unmarried; fourth daughter **Sara Christina** (24.01.1751 – 17.01.1835) remained childless and the fifth daughter **Sophia** (8.11.1757 – 20.02.1830) was the prettiest of the girls and her father’s favorite and had one daughter. Their second son **Johannes** (07.4.1754 – 07.3.1757) died before his third birthday.

One may be surprised to know that this great naturalist was against educating the girls in formal schools. He wanted his daughters to be strong, competent housekeepers and no fashion dolls. Though the Genus *Linnaea* was created as early as in 1737 by Gronovius, Linnaeus named a species under this Genus, *Linnaea borealis* L. (Caprifoliaceae) in 1753. On the other hand, the genus *Moræa*, after Sara Elisabeth Moræa, was created by Miller in 1758

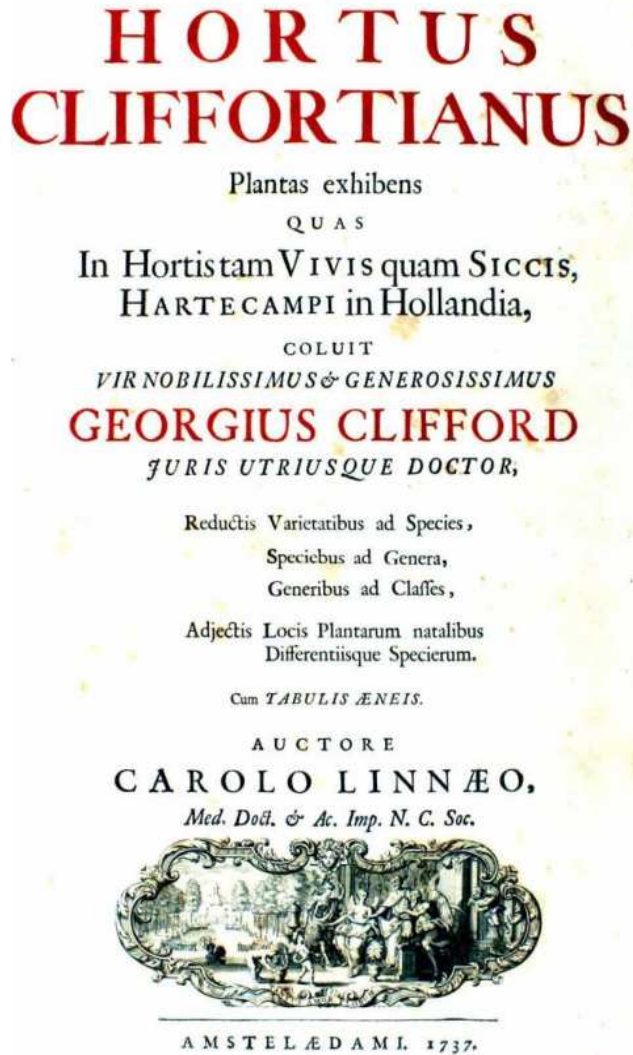


Fig.2: The front page of *HortusCliffordianu* by Carolus Linnaeus

The image shows a handwritten signature in black ink. The signature is written in a cursive style and reads 'Carl v. Linné'.

Fig. 3: Signature of *Carl von Linné*

and Linnaeus never named any species under this Genus. However, Carl Jr named one plant as *Moraea aphylla* L.f. (Iridaceae).

Linnaeus' last years were troubled by weak health, and he was troubled by gout and chronic tooth aches accompanied with depression and pessimism. Probably a series of mild stroke in 1774 greatly weakened him, and two years later he suffered another, losing the use of his right side. He died on 10th January 1778 in Uppsala, during a ceremony in the Uppsala Cathedral. He was buried in the cathedral.

Linnaeus's books, letters, and collections everything remained in the possession of his family. After his death, his wife, Sara Lisa, in need of money to give dowry for her four daughters, decided to part with the collections and unable to find a buyer in Sweden, willing to pay the requisite 1.000 guineas sterling, she sold these to the young English medical student and naturalist James Edward Smith. After Smith's death in 1828, the collections were transferred to Linnaean Society of London which had been founded by Smith and other naturalists in 1788.

In one of his autobiographies Linnaeus lists his own achievements, "*No one has been a greater Botanicus or Zoologist. No one has written more books, more correctly, more methodically, from his own experience. No one has more completely changed a whole science and initiated a new epoch. No one has become more of a household name throughout the world...*", plus another fourteen exploits.



Fig. 4. Front piece from *Hortus Cliffortianus*