

Carl Linnaeus: king of the kingdom, class, order, genus and species

by Carl Larsen

He's the man who gave all of us our name - Homo sapiens, a scientist whose presence is as near as the garden out the back door.

Yet, for many, Swedish botanist and physician Carl Linnaeus may be an obscure personage last dredged up as an answer on a high-school exam.

KING OF KINGDOMS - Carl Linnaeus established a naming system for plants and animals. At right is his 1737 illustration of *Browallia*. CNS Photo courtesy of The Huntington Library. It was Linnaeus (1707-1778) who undertook a task so Herculean that today it seems impossible to think that one person would attempt it. His goal was to describe the entire natural world in large measure by assigning each plant and animal with a two-part name.

His was a deceptively simple system known as binomial nomenclature that spelled out genus and species with two Latin words. But it shook the foundations of 18th century science, a period when observation and knowledge of the natural world was exploding.

Despite his many other pursuits, perhaps Linnaeus' greatest legacy is that his method for naming plants and animals survives to this day, although not without alteration or challenges from modern science. His language is international, used by those heading to the nursery to purchase an *Aloe vera* (named by Linnaeus) as well as by biotech researchers in Brazil working to produce fuel from sugar cane.

THE HUNTINGTON LIBRARY

Today he is known as the father of taxonomy, the science of classification of living things. This year marked the 300th anniversary of his birth, and Linnaeus was toasted around the world, especially in his hometown of

Uppsala, Sweden. There, at Uppsala's great cathedral, the emperor and empress of Japan, Akihito and Michiko, joined Sweden's King Carl Gustaf and Queen Silvia in paying tribute to "Mr. Flower Power," the description of Linnaeus on a Web site marking the celebration.

In other major tributes, the annual Chelsea Flower Show being held in London included an exhibition on Linnaeus. In Southern California, the Huntington Library, Art Collections and Botanical Gardens in San Marino had an exhibition on Linnaeus that connected an exhibition of rare books - including his two best-known works - with signs in the famous gardens that point out plants that he named.

DOCTORING WITH PLANTS

So, who was this man being so widely hailed today? To sum up his importance, one of Linnaeus' own catchphrases comes in handy: "God created, Linnaeus organized."

"He was born to study plants," said James P. Folsom, director of the Huntington's Botanical Gardens.

Linnaeus' interest in plant life developed by the time he was a teen. Later in medical school, his studies included rigorous botanical training because doctors were expected to prepare drugs themselves derived from medicinal plants. While known for his research, he continued to practice medicine and became personal physician to the Swedish royal family.

In Uppsala today, Linnaeus is ever present. Shops and restaurants carry his name, and three gardens have direct connections to his work. Two are in the city, including the formal baroque-style Linnaeus Garden that he turned into one of the foremost gardens of his time. Another is the larger Botanical Garden at Uppsala University, created by a Linnaeus disciple.

But perhaps the most engaging is the garden at Linnaeus' estate 10 miles outside of town at Hammarby. There visitors are greeted by flower beds re-created from Linnaeus' own design. Elsewhere on the grounds, there are trees planted by him and the remnants of a Siberian Garden, created from bulbs and seeds sent to Linnaeus by Catherine the Great of Russia.

Hans Odoo, who plays the role of Linnaeus for tourists and at scientific gatherings, stooped down to show a visitor last year an intriguing plant at the estate. Putting a lighter close by while breaking a piece off, it suddenly burst into a small flame.

ORDER AND ACCEPTANCE

During a 40-year period, from 1730 to 1770, Linnaeus brought order to scientific fields where there had been none. In effect, by developing the system for naming organisms and forcefully presenting his ideas, he made sure everyone was on the same page. When he was done, he had classified more than 8,000 plants and 4,000 animals.

These were put into a framework of five main categories - kingdom, class, order, genus, species. (A sixth category, family, was later inserted between order and genus.) The world was guided by publication in 1735 of his "Systema Naturae," his effort to classify the natural world that started as a small pamphlet and evolved into an immense multivolume reference.

Before Linnaeus stepped in, scientific names for plants and animals were confusing and failed to convey relationships between them. Under his system, for example, the name for a type of rose became simply *Rosa canina*, which replaced several confusing earlier names, like *Rosa sylvestris inodora seu canina*.

"It wiped out all the others," said Folsom, as he described how the Linnaean system of plant classification quickly became the standard.

Leafing carefully through rare books that are part of the Huntington exhibit presented in conjunction with the Swedish Consulate in Los Angeles, Folsom showed how over a matter of a few years Linnaeus' categorizations had swept the botanical world.

Opening an oversized volume from the mid-18th century, Folsom said, "This is the Sunset Western Garden Book of its day."

Titled *The Gardeners and Florists Dictionary or A Complete System of Horticulture*, it was written by Phillip Miller, chief gardener at London's Chelsea Physic Garden. Successive editions of the book grudgingly made concessions to Linnaeus' system until, by the eighth edition of 1768, the conversion was complete.

Today, through an international accord, Linnaeus' book *Species plantarum* (1753) is the accepted Bible from which all plant names are derived.

To scientists and gardeners, the simple mark of a capital L followed by a period behind the two words of Latin identifying a plant signifies that it was Linnaeus who first assigned it the name.

PLANT SEX

But Linnaeus was not without fault. For a while, he believed that plants were interchangeable around the globe - so that what grew in the tropics could grow in Sweden - a notion he eventually abandoned.

And some of his descriptions of various ethnic groups today would be branded as racist.

But he enjoyed immense popularity, leading his followers on partylike outings to collect herbs and insects, and sending his student disciples on far-reaching collection expeditions. Two of them sailed around the world with Capt. James Cook. In 1762, well-established, he became a Swedish nobleman, taking on the name Carl von Linn.

"Botanizing with Linnaeus would have been the equivalent of studying geometry with Euclid, or taking a writing class with Shakespeare," wrote New Zealander Kennedy Warne in Smithsonian magazine.

If Linnaeus shook the scientific world, he also shook sensibilities of the time.

Long before Darwin, it was Linnaeus, said Folsom, who "scandalized people by placing them in the same category as monkeys."

But the real shock was his promotion of the concept that plants reproduce sexually and his comparison of plant sexual reproduction to that of humans. He looked at the number, length and features of pollen-bearing stamens, the male reproductive part, in relation to the pistil, the female reproductive organ that includes an ovary where fertilization occurs.

"Nine men in the same bride's chamber, with one woman," he wrote about flowers with nine stamens and one pistil. One critic called Linnaeus' system "loathsome harlotry."

At the Huntington exhibit, an interactive display allows visitors to use the Linnaean "Sexual System" to

classify cut flowers.

Spokeswoman Lisa Blackburn described the display: "A diagram helps them determine whether a husband (stamen) has one wife (pistil) or several, and whether they sleep together in one bed (the same flower) or in separate beds (different flowers). They can also look for concubines, hermaphrodites, and husbands with no affinity for their wives."

NATURE'S LIBRARIAN

Linnaeus' birth is being marked at a time when cloning and research into the very fabric of life is gaining high speed.

The fact that Linnaeus' system has endured so long is a testament to his work, but in today's era of DNA research, some in the scientific community are saying the system is outdated and unable to keep up with the explosion of discoveries in bioscience.

But it would be difficult to discard Linnaeus' work, said Folsom, precisely because it gives scientists and laymen a common platform.

"You're not going to go to the nursery and ask for an L6967," he said. "We need a way to describe things. It's still so useful."

Warne, the magazine author, said that in New Zealand, "almost as far from Sweden as it is possible to be," he too raised "a glass (of aquavit) to the inventor of science's universal language, nature's chief librarian, and, as one of his contemporaries described him, 'the most compleat naturalist the world has ever seen.' "

Delicately rearranging exquisite leather-bound volumes in a trolley holding a selection of Linnaeus' writings and those of his contemporaries, Folsom said, "This is an incredible life. His genius is for order. And these books laid the groundwork."

LINNAEUS ONLINE

To see the gardens Linnaeus and his followers helped shape in Sweden, click on the Uppsala University site: www.botan.uu.se/Historia/History. There you will find information on the two gardens in the city, and the one at his estate in nearby Hammarby.

More information can be found at www.linnaeus2007.se, the official Swedish Web site of the tercentenary, with information in English. Other sources are www.uu.se/linne2007 and www.linnaeus.uu.se/online/index. Both are operated by Uppsala University and have a wealth of biographical information in English as well as discussions of Linnaeus' contributions to science and philosophy.

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