

CARL LINNAEUS' CONTRIBUTIONS AND COLLECTIONS

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Carl Linnaeus' Early Life and Schooling

Carl Linnaeus, the eldest of Nils Ingemarsson's large family, was born on the 23rd of May, 1707. Destined to become a revered contributor to the field of taxonomy, Linnaeus' early years were fraught with poverty and indecision as to his goal in life. His father, a vicar at Rashult, devoted much of his time to caring for a garden of trees, shrubs, and flowers. The family name, not having been chosen was changed to Linnaeus, out of regard for a large linden-tree which was growing near the home. Carl early displayed an aptitude for the study and care of plants. He shied away from the high calling of the priesthood which his father intended for him. At school he succeeded in the physical and biological sciences. When twenty years of age, he became an under-graduate in the University of Lund where for one year he began the study of medicine. The next year, 1728, he transferred to the University of Upsala where he could get better training in medicine. Linnaeus, because of the lack of funds, was handicapped in his early studies but due to his manifest native ability and achievement in the Natural Science he was soon rewarded by grants and financial aid.

In 1732, Linnaeus was chosen by the Academy of Upsala to make journeys of exploration in Lapland. He spent five months traveling more than 4000 miles collecting and recording observations on the plants, animals, and customs of the Laplanders. Upon his return to Upsala he began to give lectures on Botany and Natural Science, but was soon prevented from continuing them because of a lack of a degree.

While exploring in Lapland, Linnaeus made the acquaintance of his future wife, daughter of a wealthy physician of Falun. When he asked for her hand in marriage her father consented only on the condition that he would obtain a medical degree and establish himself in the practice of medicine. In order to prepare himself to earn a living he, therefore, decided to finish his medical studies at the University of Harderwyck in Holland. He had practically met the requirements for the medical degree by his previous studies at Upsala.

Linnaeus Spends Three Years in Holland and England

With some financial help from his fiancée he entered the University at Harderwyck from which institution he was granted the degree in June, 1735. He did not return to Upsala, but applied himself to the completion and publishing at Leyden of the first edition of the *Systema Naturae* which made of him a famous botanist. His

1. Contribution No. 167 from Department of Zoology and Entomology, Brigham Young University



This portrait of Carl Linnaeus was painted by Martinus Hoffman in 1737 during Linnaeus' stay at De Hartekamp. Linnaeus is shown in his Lapland costume. On his belt is a knife, runic calendar, a tobacco pouch and a pair of gloves. In his left hand he holds a fortune-teller's case. The original portrait is in the National Museum for History of Science at Leyden.

finances now almost exhausted, upon the recommendation of the foremost physician in Europe, Hermann Boerhaave, head professor of Medicine at Leyden University; he became physician in ordinary of the Amsterdam burgomaster Clifford at the Country-seat "De Hartekamp," now the "Linnaeushof."

For a few days in May, 1957, the writer had the opportunity of visiting Linnaeushof. In the middle ages this countryside was treeless and sparsely populated. By the middle of the 17th Century the mercantile population of Holland was establishing country summer residences in this dune area. The lands were planted with oaks, beeches, and firs, etc. in order to bind the drifting sands. Many of these trees still grace the landscape around Linnaeushof. Some of the estates were planted with exotic plants and extensive formal gardens. With the coming of the Amsterdam and Leyden Canals, about 1650, many of the smaller country holdings were consolidated into large estates. One of these was "De Hartekamp."

When Linnaeus took up his abode in the autumn of 1735, as the physician of the wealthy banker, Mr. Clifford, he was overwhelmed by the beauty and richness of the flora and fauna of this homestead. One of the important books which he wrote while at "De Hartekamp," now a book-lover's delight, was "Hortus Cliffortianus." To quote Linnaeus in his preface to this unique book he describes his stay as "the happiest time of my life." He also writes, "My eyes were at once delighted by so many masterpieces of nature supported by art, avenues, flowerbeds, statues, ornamental waters and hills and mazes so ingeniously made. I was fascinated by your menageries full of tigers, monkeys, wild dogs, Indian deer and goats, South-American and African swine. Their cries mixed with those of flocks of birds, such as American Falcons, various kinds of parrots, pheasants, peacocks, guinea-fowls, American black game, Indian fowls, swans, different kinds of geese and ducks, gulls and other kinds of web-footed birds, snipe, American crossbills, different species of sparrows, turtles and other pigeons, as well as many other species of birds whose cries the garden echoed with.

Linnaeus continues: "On entering the hothouses I was amazed at the abundance of plants, as a Northerner I could not but feel bewitched, not knowing in what foreign part of the world I had landed. In the first hothouse masses of flowers originating from southern Europe were grown, plants from Spain, southern France, Italy, Sicily and the Greek Isles. In the second treasures from Asia were found, such as ginger plants, poincains, magistans, coco and other palms, as well as other species; in the third I saw Africa's plants peculiarly shaped or rather misshaped, such as the numerous forms of aloes and mesembryanthenums, carrionflowers, euphorbias, crassula and protea-species, etc. In the fourth and last hothouse the charming inhabitants of America and of the rest of the New World were grown, such as big groups of cactus species, orchids, passion-flowers, yam, magnolias, tulip-trees, calabash-trees, arrow-root, cassias, acacias, tamarind-trees, pepper-trees, species of pine-

apple, manicinilla and numerous other plants which surrounded bananas, the most stately plants in the world, exquisitely beautiful hermandios, silvery glossy protea species and most valuable camphor-trees. When after admiring all this, I entered the truly royal house and the extremely instructive museum, whose collections no less added to the proprietor's fame, I stood entirely fascinated, because I never saw the like of it before. My fervent wish was to lend a hand to the care of all this."

It was in such a naturalist's paradise as this that Linnaeus found himself. Here his grandiose plans come to maturity, and as a result of his new situation and studies he wrote some of his botanical books which laid a basis for present day botany. During the next two years he produced a series of works, most of which were new contributions in the field of Natural Science, such as the *Bibliotheca Botanica*, *Fundamenta Botanica*, *Flora Lapponica*, *Genera Plantarum*, and *Critica Botanica*. Linnaeus was busy during the three years he was away from Sweden. In 1736 he spent three months in England; the cost being borne by Clifford. While at "De Hartekamp" his health was broken due to long hours spent writing his books. For a year before returning to the University of Upsala in July 1738, he studied at Leyden and visited the great naturalists in Paris.

The leaders in the Haarlem area of Holland in April, 1956, feeling a responsibility towards the past and the future, set aside a portion of the "De Hartekamp" as a botanical garden to be known as "Linnaeushof." The following is a quotation from a speech by the Right Honourable Dr. M. J. Prinsen, Governor of the Province of North Holland at the inauguration of the "Linnaeushof."

"The informant of the Swedish Embassy conveyed to me the kind request to open to the public this garden sacred to the memory of Linnaeus.

"In 1735, he came to our country, and through the great Boerhaave he was placed in entire charge of the botanical garden "De Hartekamp," the country-seat of the Amsterdam burgomaster Clifford. The part which now is the Linnaeushof, was the so-called "Overplaats" of the Hartekamp. Linnaeus had attracted general notice by a booklet of 14 pages only, the *Systema Naturae*, which he had written at Leyden, and which leapt into fame. In this booklet he upheld a novel division of the realms of nature, viz. the vegetable kingdom, the animal kingdom and the mineral kingdom. At the Hartekamp Linnaeus spent happy years, and thanks to his endeavours and work the "Hortus Cliffortianus" was called "Europe's most beautiful garden" in those days already.

"I wish to put forward these few facts in this connection in order to bring home to you that you find yourselves on historic soil, and that you and I are under great obligations to the past. Next to this debt of gratitude there is our responsibility towards the present. For unfortunately the Linnaeushof is one of the few survivals of the ancient hilly woodland between the bulb-district and the more and more increasing population of Haarlem and Heemstede. The

preservation of rural scenery in this country on the estates at the foot of the dunes, and which are on the provisional list of nature reserves, is a matter of national interest."

A year after Linnaeus returned to Sweden he married his faithful fiancée, but did not establish a medical practice, since he was appointed to a professorship of physics and anatomy at the University of Upsala. In 1742, he was given the chair of botany which position he held until his death in 1778. He was succeeded by his only son who died in 1783. At the death of his son, his mother and sole executrix offered the whole of the Linnean collections and books for sale.

**Linnaeus' Collection and Library Purchased by
James Edward Smith of London, England
Founding of the Linnean Society of London**

Since so few of the local biologists are aware of the present location of Linnaeus' collections and library, I feel that it is an opportune time to make the following brief report to the membership of the Utah Academy.

The following excerpts are from a four-page pamphlet, published by the Linnean Society, entitled: "The Linnean Society of London: Its Origin, History and Objects." October, 1948.

"The circumstances that led to the founding of the Linnean Society of London ten years after the death of the great Swedish naturalist Carl Linnaeus (1707-1778), from whom it takes its name, were closely connected with the purchase of the Linnean Collections by an Englishman. On the death of the younger Linnaeus in 1783, his mother and sole executrix offered the whole of the Linnean Collections to Sir Joseph Banks, and on the morning when this offer was received, James Edward Smith (1759-1828) a young Norwich medical student then settled in London was breakfasting with Banks, who told him that he intended to decline the offer, and strongly urged him to become the purchaser. Smith wrote to Upsala the same day, and the purchase money, one thousand guineas, was advanced by Smith's father; the collections and books arrived in London in 1784.

"The chief collections now possessed by the Society are those of Linnaeus, the younger Linnaeus, and Sir James Edward Smith; also a British Herbarium founded upon the collections of N. J. Winch, W. Withering, and others.

"The Library of the Society has grown rapidly during its existence, and now contains about 70,000 volumes in addition to the books which belonged to Linnaeus, many of which are enriched by his notes; the Society also possesses many manuscripts of value, and a fine series of portraits. The number of Fellows exceeds 700, with 50 Foreign Members and 25 Associates *honoris causa*, as well as 20 ordinary Associates."

Collections of Plants and Animals from America Studied by Linnaeus

Some of the specimens of this valuable collection come from North America. The first English scientist in America was Thomas Harriott, age 25, who came to the Carolinas with Raleigh (1585). He was one of the foremost scholars of his time, having been schooled at Oxford his birthplace, 1560. He made a collection of mammals, birds, fishes and plants. Harriott had a companion, John With (White),² who made 112 drawings in water color of the plants and animals studied by him. These drawings are now in the British Museum. When Harriott returned to England he prepared a book *Brief and True Report of the New Found Land of Virginia* which was published at Frankfort-on-the-Main in 1590. In his book Harriott refers to some of the fishes of Carolina; lists the names of 28 species of mammals and 86 species of birds, 25 of which were illustrated by With. The Natural Science of North America thus begins with Thomas Harriott.

Harriott's specimens and report created in the European University circles a keen interest in the flora and fauna of the new found country. In fact, all Europe was anxious to hear the wonders of America and to see the interesting animals and plants which explorers might be able to bring back to the centers of learning. Most, if not all, of these specimens were sought after by princes or wealthy land-holders, the like of Mr. Clifford. Peter Artedi a countryman and classmate of Linnaeus' applied himself to Zoology, chiefly ichthyology. In 1734, he went to London where he continued his studies in Zoology. A year later, 1735, he came to Amsterdam where he was employed to study a larger collection of fishes belonging to a wealthy apothecary. During these years he prepared a work on fishes which was later published by Linnaeus, since Artedi was drowned in the autumn of 1735. Throughout Artedi's treatise are many references to fishes from America. He saw and studied these fishes in collections at Amsterdam, the Hans Sloane collection in London, and in Chelsea and at Stratford in England. Many of the collections made in America prior to and during the lifetime of Linnaeus fell into his hands and many of the species were described and incorporated into the editions of his *Systema Naturae*.

Captain John Smith who re-established the English in the New World at Jamestown in 1606, had a report on the life of Virginia printed in 1612 and his General History in 1624. In these, birds, mammals and fishes are listed, thus supplementing the reports of Harriott.

In the Plymouth colony such men as Thomas Morton, Thomas Glover, William Wood, and John Josselyn contributed to the knowledge of the natural history of the New England states between 1634 and 1700. Some of these men were correspondents of the Royal Society of London. Charles I and Charles II of England were inter-

2. Rowse, A. I. "The Elizabethans and America Part II. Of Raleigh and The First Plantation" *American Heritage*, Vol. X, No. 3, pp. 5-19, 1959.

ested in the fauna and flora of the New World, and Charles I sent John Tradescant, the younger, to collect plants and animals.

Other notables of the seventeenth century and early eighteenth century were John Banister (1668-1700); John Clayton (1685-1773); John Mitchell (1680-1772); William Byrd (1674-1744); Dr. Alexander Garden (1728-1791) and Cadwallander Colden (1688-1776). These collectors and observers, along with John Bartram, sent large collections of animals and plants to England. Peter Collinson and John Ellis, London merchants who never were in America, assisted the above-mentioned men to get their collections to England and into the hands of responsible workers.

John Banister, a clergyman and also a student of John Ray, became a careful collector and student in Virginia. He sent a paper to the Royal Society in 1693 with drawings of the land snails and muscels of his area. He also collected insects and sent his observations on fifty-two species to England. This report was published by the Royal Society in 1701. Banister was a botanist of note. His "Catalogus Plantarum in Virginia observatarum" was printed in 1686 and Goode³ records this as the first taxonomic paper upon natural history which emanated from America.

John Clayton, Attorney-General of Virginia who spent fifty-one years in this country, made a wide collection of plants. He corresponded with Linnaeus and Collinson. His "Flora Virginica" through the assistance of Gronovius and Linnaeus began to be published in 1739 and extended to 1762 before being finished. The large collection of plants as well as manuscripts made by Clayton were destroyed by fire. This was probably the most important botanical work in America prior to Gray and Torrey. According to Goode, Linnaeus is said to have called Clayton the "Greatest natural botanist in the world," and George III honored him in 1765 with the title of "Botanist to His Majesty for the Floridas," and bestowed upon him a pension of fifty pounds a year.

Dr. John Mitchell published a paper entitled the *Elements of Botany and Zoology*. This was in 1738, contemporary with Linnaeus' first edition of his *Systema Naturae*. Mitchell was a fellow of the Royal Society and corresponded with Linnaeus.

Dr. Garden was a botanist, but did his best work in fishes and reptiles. He sent large collections of fishes to Linnaeus. So well preserved were these fishes that when Dr. Goode examined them in 1883, he found them in excellent condition in the Linnaeus' collection in London.

Garden, Colden, Bartram, Mitchell, Clayton, and Ellis, as well as Linnaeus' own students Kalm, Alstroem, and Kuhn, were active in supplying Linnaeus with plant and animal specimens. Great progress was made in bringing to light the fauna and flora of the new, as well as the old world. For example, John Ray in 1690 made an estimate of the number of plants and animals known at that time.

3. Goode, G. Brown, 1886 "The Beginnings of Natural History in America" Proc. Biol. Soc. Washington, Vol. 3, pp. 35-105

The mammals and serpents were placed at 150 and the birds at near 500. Linnaeus in his twelfth edition described 210 mammals, 124 reptiles and 790 species of birds. Note that 78 mammals, or one-third of Linnaeus' list were American; 88, or two-thirds of the reptiles were from America, and one-third of the birds were American.

It is also of interest to point out that forty-five species of birds known to occur in Utah were named by Linnaeus. Many other species of the Utah fauna were also named by Linnaeus, in spite of the fact that he never traveled outside of Europe and England.

It was my good fortune to spend some time in June, 1957, in the collections and library of the Linnean Society of London now located in the Burlington House, Piccadilly, London, WI. I examined the original journal kept by Linnaeus while on his Lapland expedition. His notes in his hand writing are interspersed with drawings illustrating the plants, animals and Laplander's handy work. I saw the insect collection and was permitted to study some of the specimens with a wide-field microscope.

**Linnaeus after 200 Years, 1758-1958;
Darwin after 100 Years, 1859-1959**

Linnaeus had great ability and a yen to categorize the animate world. True, he used the findings of his predecessors and contemporaries in making his generalizations and establishing his nomenclatorial systems. He did, however, for the first time divide the animal kingdom into classes, which he characterized, introduced orders for the first time into the system of Zoology, besides definitely establishing genera and species which had been vaguely distinguished before. He succeeded in placing every known plant and animal, of his time, into the categories of his system. In doing this he established his binominal system, that of giving each plant and animal species a generic and species name of two words. Linnaeus must also be given the credit for the development of a method of formal description of organisms which is essentially similar to that still in use today.

By the way of review it may be well to point out that during a period of 40 years while Linnaeus was bringing about these reforms, he was building for himself a rating as the outstanding naturalist of the 18th Century. His epoch-making contribution, the *Systema Naturae*, small though it was in the beginning, 1735, grew into a mighty tome by 1766. It is quite impossible to measure its impact upon the development of Natural History in America as well as in the world.

Last year, 1958, we honored Linnaeus for his *Systema Naturae* and other contributions of 200 years ago. This year, 1959, we pause to do honor to Charles Darwin for his "Origin of Species" of 100 years ago. These two great men, however, did not agree as to the origin of species. Linnaeus believed in the fixity of species as opposed to Darwin's belief in changes and evolution by natural selection. The publication of Darwin's "Origin of Species by Means of Natural Selection," has had much to do with the making of contrasts between

the beliefs and practices of naturalists before its appearance and those of their present successors. The coming forth of this book has resulted in a tremendous stimulation of biological thought and work. It has had a great effect upon the Linnean taxonomy, through the introduction of a belief of species continuity and phylogeny. Naturalists for the past century have been led to develop the basic fields of physiology, comparative morphology, embryology, genetics, and ecology and to turn the spotlight of their findings upon the systematics and phylogeny of the almost unbelievably great number of described species.

To both of these great naturalists who helped to bring order and a natural understanding of a world of more than one and one-half million plant and animal species, we owe a great debt of gratitude. Biologists of today follow and use their findings in the building of their biological philosophy.