9 Carl Linnaeus in his time and place

When visitors arrived in Uppsala, Sweden, to meet the Enlightenment's most famous naturalist, Carl Linnaeus (1707–78), they were surprised to encounter 'a somewhat aged man, not tall, with dusty shoes and stockings, markedly unshaven and dressed in an old green coat'.[1] At the Swedish court, Linnaeus's charm was considered to be precisely that his entire person remained that of a provincial parson. This slovenly, argumentative little man even admonished the queen herself. And she was the sister of Frederick the Great of Prussia, and a formidable woman who bottled her own stillborn child for her curiosity cabinet. Yet Linnaeus's surly self-confidence only enhanced the fact that alongside the guenon monkeys, Sami servants, African slaves, and all the other wonders, he himself was part of the royal curiosity collections which he curated.

European visitors, however, were disappointed to meet in Linnaeus a provincial. Apart from a mongrel Latin, he spoke only his own vernacular south Swedish. He read no modern languages, and lacked both general culture and the 'new science'. His foreign students especially disliked the way in which, every Sunday, Linnaeus called in a tenant farmer to play the fiddle, and then watched as they danced the reel with his four unmarried daughters (girls kept semi-literate so as not to compromise Gothic housekeeping with French fashions).

Still, Linnaeus was considered 'the greatest Botanist that the world ever did or probably ever will know'.[2] He was compared to Solomon, Socrates, Galileo, and Newton. Yet Linnaeus had neither mathematized living nature, nor identified general laws explaining life's diversity. He was chiefly a floral classifier, and without a single, towering achievement to his name. His great reputation rested instead in the democratizing accessibility of his achievement. For the value of Linnaeus's classifications lay in their humdrum, everyday usefulness, for casual and serious users alike. In his guides and handbooks, and in the structure of his systems as such, Linnaeus lowered the educational and financial entrance fee to the study of nature.

The sexual system of plant classification

In *Systema naturae* (1735), Linnaeus first presented his global classification of natural productions to the international public. One Dutch friend nicely summarized its significance:

> [With Linnaeus's] Tables we can refer any fish, plant, or mineral, to its genus, and, subsequently, to its species, though none of us had seen it before. I think these Tables so eminently useful, that every body ought to have them hanging in his study, like maps.[3]

Linnaeus's *Libellus amicorum* ('Booklet of Friends') (1734–8), the souvenir booklet which he prepared for his 1735–8 travels abroad, similarly planned

> all three of nature's kingdoms depicted on maps or paintings printed under the title *Geographia Naturae*.[4]

Linnaeus began his 'geography of nature' as early as 1727, as a twenty-year-old student at Lund University, south Sweden. In the following year he transferred to Uppsala University. Both these centres of learning were sleepy little towns, teaching the rudiments of Lutheran orthodoxy to the future parsons and civil servants of the Swedish state, a Spartan war machine now, after the defeats of the Great Northern Wars (1700–18), without purpose.

Linnaeus was largely self-taught. Between 1728 and 1731, however, he worked as a guide in the Uppsala botanic garden, as a tutor in the home of an Uppsala professor of medicine, and as a plant collector to a professor of theology, who in preparing a 'Biblical *Botanica*' also searched Scandinavia's conifer forests for clues to Sinai's desert shrubs. Linnaeus's own first flora, from 1727, enumerated plants around his childhood home, Stenbrohult parsonage, in Smolandia. Later he inventoried the 'small and swampy Uppsala [botanic] garden by the Black Creek',[5] complaining that it 'daily decays, so that there now are hardly two-hundred [species]'.[6]

Linnaeus wrote three catalogues of plants in the Uppsala garden (each entitled *Hortus Uplandicus*), and one more in 1731, and it was then that he shifted from the systematics of Joseph Pitton de Tournefort (1656–1708) to his own '*methodus propria*' or sexual system of plant classification. In 1728, he had been much taken by a magazine review of Sébastian Vaillant's (1669–1722) work on plant sexuality. He now made it the focus for his classificatory botany. But Linnaeus also drew on other scholars, retaining, for example, most of Tournefort's genera. For the general structure of his systematics he relied on the work of the Italian Andrea Cesalpino (1519–1603), and ultimately on Aristotle.

Linnaeus created one global classificatory tree encompassing all life on earth, and divided into five levels of generality: class, order,

genus, species, and variety. He privileged the rank of genus, and sub-divided plant genera according to the number, size, placement, and shape of stamen and pistils. But he grouped animals by broad and variable characteristics, such as their teeth, locomotion, type of blood if any, and habitual home (e.g. land or water). Like Cesalpino, Linnaeus thus affirmed his theoretical allegiance to scholastic logic while preserving common-sense groupings. He also bunched most invertebrates together as *Vermes*, a folk category akin to the English vernacular 'bugs'.

Linnaeus's divisions of fauna (a term which he coined, alongside flora) was influential. He was the first to name us *Homo sapiens*, and to class us as primates. Linnaeus's central innovation, though, was the self-consciously artificial way in which he devised his floral classification. He even compared it to an alphabetical list.

By 1735 Linnaeus had essentially completed his systematic theory. In his own view, it now only remained to slot nature into his classificatory tree. He estimated that the earth housed about 40,000 plant and animal species, and a few hundred minerals. He thus could, and did, position himself as a final arbiter of all natural productions. His first major applications of his system were *Flora Lapponica* (1737) and *Hortus Cliffortianus* ('Clifford's Garden') (1737). Their exoticizing frontispieces nicely parade their Arctic and tropical plentitude. These works drew on Linnaeus's two formative projects outside of a university setting: his 1732 Lapland journey, sponsored by the Societas Regia Literaria et Scientiarum Sueciae (Sweden's first scientific society, founded in Uppsala in 1710 as the Collegium Curiosorum); and his work as a curator of the botanic garden of a Dutch banker, George Clifford, during his 1735–8 stay in Holland.

As he extended his systematizing, Linnaeus scoured earlier literature for species citations. But as a point of method, he privileged first-hand experience. He made no distinction between herbarium studies and collecting and travelling, however. At times he also cribbed unverified data from secondary sources. Yet, because many Linnaean holotypes (the specimens on which he based those of his species descriptions that are now regarded as foundational) have survived, we can evaluate Linneaus's observational style in detail. He was a gifted and rigorous examiner of nature.

Linnaeus emphasized that both learned and lay people could cooperate in his mechanized classificatory work. Whilst involving himself in learned correspondence networks, he also reached out to new audiences and collaborators. His botanical handbooks were brief enough to be read with ease, and small enough to carry into the field. He wrote them in a straightforward, unornamented Latin, and encouraged vernacular translations. In their format – they were each divided into twelve chapters and 365 aphorisms –

they were reminiscent of the Lutheran almanac. Linnaeus probably imagined his followers learning an aphorism by heart every day, just as his father's parishioners rehearsed their daily catechism.

Linnaeus bragged that because the sexual system depended on a few, easily observable features, coloured or engraved images were superfluous. Poor students and the common people could now become proficient botanists, for an expensive library and previous instruction were no longer essential to a botanist's training. 'Yes, even for Women themselves',[7] botany was now a possible science. As further encouragement, Linnaeus gave botanic discoverers honorific floral names. He named plants for women, farmers, and artisans, and once even, to the envy of his 'master', for a Surinam field slave.

Linnaeus also spelled out botanical practices to aid the novice. Thus *Philosophia botanica* (1751), his most important botanical guide, ends with a series of one-page instructions, teaching the reader how to set up a herbarium, organize an excursion, plant a garden, and even embark on a voyage of discovery. He added ten full-page diagrammatic line drawings of plant parts, as well as several indexes.

Philosophia botanica's regime stemmed from Linnaeus's own practices. As early as 1733, Linnaeus guided fellow students on excursions around Uppsala. In 1739 he combined his natural history lectures to the Swedish House of Nobility with floral ramblings on Stockholm's islands. In the 1740s, at Uppsala University, he led day-tours for as many as 300 men and women.

For these hikes Linnaeus regulated reading-lists, departure times, and public 'demonstrations'. He itemized objects to collect, such as 'little birds that are shot', and listed field equipment such as vascula, field microscopes, magnifying glasses, note-papers, butterfly nets, insect-pins, and pocket-knives. He also established labour divisions: 'Sharp-Shooters' killed birds, 'Annotators' protocolled results, and 'Fiscals' guaranteed 'the troops' discipline'.[8]

Linnaeus repeatedly promised to replace his sexual system with a natural system. This he variously likened to a chain, countries nestling on a map, knots in a fishing-net, and a grove of trees. And he believed it was somehow encrypted in the relation between all seven basic parts of fructification (calyx, corolla, pericarp, pistil, seed, stamen, and receptacle). Another clue, he suspected, was to be found in his hypothesis that modern species, while probably fixed in the present, had hybridized from a small number of Edenic life-forms, each representing one of the present-day orders. Yet his efforts, as he lamented, always remained fragmentary.

However, in Linnaeus's view, an artificial and a natural classification were not two distinct schemes between which one was forced to choose. Rather, the one was linked to the other, as a provisional but necessary means to a more perfect but remote end.

Only when his own giant file index of nature was completed, he thought, would the regularities of nature's diversity reveal themselves. In the meantime, Linnaeus initiated an atheoretical systematics, where lay collectors enjoyed the same status as natural philosophers.

Similarly, Linnaeus's prefaces encapsulated his classifications in an Aristotelian physics, with its four elements of Water, Fire, Earth and Air, and a Christian theology, emphasizing the perfection of God's material creation. But this framing effort did not intrude on the systematizing endeavour itself.

Binomial nomenclature

In *Philosophia botanica* (1751), Linnaeus suggested that each life-form should be labelled with a 'trivial name', or a two-word reference, denoting its genus and species. Altogether, Linnaeus thus named around 7,700 plants and 4,400 animals. Today Linnaeus's binomial nomenclature is considered his only lasting contribution to science. The names of plants (1867), animals (1906), bacteria and viruses (1948), and cultivars (1953), are all generated according to taxonomic codes that start in Linnaeus's *Species plantarum* (1753), for flora or *Systema naturae* (10th edn, 1758) for fauna. Historians have argued, variously, that Linnaeus's binomials were inspired by scattered precedents in Renaissance herbals, by folk names (such as 'barn owl'), or by his habit of abbreviating bibliographical references.[9] My own archival research suggests that alongside such general influences, a specific story lies behind Linnaeus's binomials.

Early modern botanists, Linnaeus included, constructed diagnostic phrase names (a brief species description which simultaneously functioned as a proper name) by pairing opposed characteristics, descending from the general to the specific. These phrase names were up to half a page long. They also varied from author to author. Thus some scholars initiated zoology trees with a four-footed–two-footed division. Others began with a blooded–bloodless split. Such trunk choices in turn determined how living beings were grouped (and named) in the branches of the classificatory trees. Thus, when in 1729 Linnaeus was first examined on his knowledge of individual plants by an Uppsala professor, as he later remembered, he 'answered them all with the names after Tournefort's method'.[10]

Diagnostic phrase names also changed over time, even in a single author's *oeuvre*. For they were constructed so as to distinguish the bearer of a name from its congeners (members of the same genus). Each time a new species was added to a system, all its congeners needed (in theory at least) new names.

Thus a young scholar might find himself haplessly reclassifying

an entire kingdom. Indeed, when in 1730 Linnaeus set up a botanic system of his own, he simply followed the routine procedure of the botanic novice. In 1729 Linnaeus's best friend (also an Uppsala student) had similarly written a local flora, 'ordered', as he put it, 'after the very simplest and clearest Method', namely his own.[11]

At Uppsala University in the 1740s Linnaeus noticed that his students found diagnostic phrase names difficult to use as proper names in their encounters with both unknown flora and older texts. As was common in the period, they generated their own home-made abbreviations. But together Linnaeus and his students also began experimenting with communal, and more practical, ways of referring to individual species. They used, variously, folk names, bibliographic references, and the consecutive numbers which species were then commonly assigned in classificatory publications (somewhat as we number colour plates in art books today).

However, since in subsequent editions newly discovered species were listed in their appropriate genera, consecutive number sequences were unstable over time. Linnaeus and his students therefore used a set of numbers (assigned in the 1745 edition of Linnaeus's *Flora Svecica*) as stable and independent references. They had invented an arbitrary numerical nomenclature.

Yet around that time (1748–9) Linnaeus and his students also began using what we today know as true binomials. These first appear in printed form in *Pan Svecicus* (1749), a brief tract on cattle fodder directed against the import of cattle feed. Importantly, *Pan Svecicus* was a collaborative work. Linnaeus assigned each student a farm animal (e.g. pig, goat, hen, or cow). Clutching ink-pots, goose feathers, and scrap papers, the students tracked their animal experimenters, noting throughout the day the plants they fed upon. Altogether they listed some 850 plant species under the difficult condition of seeing the specimens disappear down the throats of their test animals at the very moment they needed to identify them.

Linnaeus's binomials thus emerged out of his students' work practices, in the context of his economic botany, and as a stop-gap measure to make his students more efficient support staff and collaborators. Later the binomials spread from Linnaeus's economic pamphlets to his classificatory tomes. By the 1760s, in an idealist reversal of reality, Linnaeus bragged of the way in which he had suddenly thought of (rather than laboriously worked towards) a true binomial nomenclature.

Voyages and collections

Linnaeus was a typical Enlightenment improver. To his Scandinavian patrons and public, he spoke of his science as serving the state's economic needs. Also, his voyages and collecting were undertaken in part for economic reasons. As he put it in 1746:

> Nature has arranged itself in such a way, that each country produces something especially useful; the task of economics is to collect [plants] from other places and cultivate such things that don't want to grow [at home] but can grow [there].[12]

As Linnaeus and his students also formulated their botanic acclimatization theory, they hoped to 'fool', 'tempt', 'teach', or 'tame' 'Indian' (i.e. American and Asian) cash crops to grow even on the Arctic tundra. Thus, Linnaeus daringly predicted, Europe could become as rich even as China.

Linnaeus himself passed up offers to explore at the Cape, in Canada, and in Surinam. But he directed and took part in explorations at home, intended to identify indigenous life-forms to substitute for imports. In a series of state-sponsored journeys, he and his students exhaustively researched Sweden's provinces. In this way his students also trained for their own long-distance travels.

From 1745 on, nineteen of Linnaeus's students left on voyages of discovery. Their teacher solicited travel funds from the Levant, Greenland, and East India companies, the Bureau of Manufactures, the Academy of Sciences, Lund and Uppsala universities, the Estates, the cabinet of ministers, and the court, as well as from individual patrons. He even staged public lotteries.

Linnaeus's travelling students included Daniel Solander, Joseph Banks's botanist on Captain Cook's first circumnavigation of the earth (1768–71); Anders Sparrman, Johann Reinhold Forster and Georg Forster's botanist on Captain Cook's second voyage (1772–5); Carl Peter Thunberg, who as a ship's surgeon in the Dutch East India Company botanized at the Cape, Java, Sri Lanka, and Japan in 1770–9, and is a crucial figure in the history of Japanese medicine; Pehr Löfling, who, in the employ of the Spanish Crown, explored the natural productions of Spain and Spanish South America in 1751–6; Pehr Forsskål, who participated in a Danish royal expedition through the Ottoman empire and the Arabian peninsula in 1761–3; Pehr Kalm, who explored north-west Russia in 1744–5 and North America's eastern seaboard in 1748–51; and Johan Petter Falck, who as part of the Russian Orenburg expedition criss-crossed parts of the Caucasus, Kazan, and West Siberia in 1768–74. Other students of Linnaeus travelled to

Lapland, the Arctic Sea, Surinam, coastal India, China, and in Africa the Atlas, mountains, Senegal, Sierra Leone, and the Cape.

Falck slit his throat, a crazed opium addict, in Kazan. Löfling and Forsskål died of tropical fevers. Other now forgotten Linnaean travellers also died during their travels, or returned insane or mortally ill. Still others survived, but lost large parts of their collections (Thunberg), or published their results only tardily (Sparrman), if at all (Solander). Mostly they became country parsons and provincial professors.

The Linnaeans' role in the history of the voyage of discovery is still important, and indeed undervalued in the historiography. But their actual achievements did not match their own and their teacher's expectations. For Linnaeus had great hopes for his travelling 'apostles', as he termed them.

Linnaeus issued these students with 'memorials', or order-lists of plants and animals. There he especially admonished them to study local peoples' knowledges of the natural world and their manufacturing techniques. For Linnaeus believed new natural knowledges could form by way of a cross-cultural mediation between high and folk/tribal knowledges. This syncretic 'new science' he regarded as simultaneously an epistemology and a technology, that is, as both a way to know, and a material tool.

Linnaeus preferred his students to travel the well-worn Cadiz–Ghuangzhou trade route, instead of visiting 'wild deserts' (as he even-handedly designated Pennsylvania and Yemen). For it was there that such prizes as tea-seeds, herbal medicines, and techniques of porcelain manufacture might be found; and thus, Linnaeus held, these voyages' ultimate aim, namely to abolish the conditions that now made them necessary, might be fulfilled.

The Linnaean ideal voyager, then, was an industrial spy in the busy cities of high civilizations, not a lone wanderer in a pristine natural world. Even if Linnaeus faithfully entered into the *Systema* the animals and plants that his travelling students sent to Uppsala, thus adding to his register of earth's life, that was not the only or even the main aim of their travels. For example, only at the very end of his 1745 'memorial' for Kalm's voyage to America does Linnaeus suggest, in a single offhand line, that next to his studies of Amer-indian economies, Kalm make his own 'observations on Birds and Fishes, on Snakes and Insects, on Plants and Trees, on Stones and Minerals'.[13]

Linnaeus carved out for himself a lucrative role as a governmental adviser on voyages, collections, and colonial economies. To take a single example, having read in travel descriptions about Chinese fresh-water pearl plantations, Linnaeus, brandishing a few small pearls which he had managed to grow in the tepid stream that runs through Uppsala, persuaded the Swedish cabinet of

ministers to fund a project to inoculate Lapland river mussels. In 1762, the Estates (the Swedish parliament) sold Linnaeus's 'secret', as he styled it, to a Gothenburg whaler, and granted the inventor 6,000 silver thalers. The Estates also granted Linnaeus the right to dispose of his university chair, and ratified the king's recommendation to ennoble Linnaeus. Thus Linnaeus bought a country estate, secured his son's succession, and was dubbed 'von Linné'.

Actual pearls were never produced. This came as no surprise to Sweden's most distinguished economic historian, Eli F. Heckscher: 'naturally, the whole apparatus resulted in nothing.'[14] Yet this is only true from the perspective of the present. From Linnaeus's point of view, his nine small pearls, supposedly demonstrating the possibility of domesticating Lapland's foamy rapids (now long since dammed for hydroelectricity) resulted in a 'national award', a family lineage, and noble status. In 1762 Linnaeus became, as he had hoped as early as 1748, 'the lord of all of Sweden's clams'.[15]

Linnaeus cast himself, then, as a political economist and an acclimatization experimenter. He took little interest in the exact sciences, however, or in technological progress (e.g., ferrous metallurgy and hydrodynamics). Nor did he interest himself in such instruments as diving-bells, steam engines, air pumps, telescopes or even – though he used them – microscopes. Linnaeus's work-spaces more recalled a Renaissance *studiola* or a curiosity cabinet. For he believed that his science reflected nature's harmony, which in turn was analogous to the order of his own study. As he put it in 1754, 'the earth is then nothing else but a museum of the all-wise Creator's masterpieces, divided into three chambers'.[16]

From his student days onwards, Linnaeus arranged around himself a home which was a microcosm of that 'world museum'. In this emporium of art and organic nature, parrots and squirrels, and even a young orang-utan, played among potted plants, insect specimens, mineral samples, scientific instruments, and herbarium sheets. Some 3,000 plant species grew in the botanic garden in which the house was placed. Over thirty species of songbirds nested in Linnaeus's chambers (he provided them with huge tangled branches). Botanic prints served as wallpaper, and were covered in turn by portrait engravings of botanists, paper sheets with handwritten botanical annotations or pressed plants, and shells and conches dangling on iron nails.

Next to family portraits and plaster medallions of royalty, Linnaeus arranged likenesses of his guenon monkeys, his tame raccoon named 'Sjubb', and a whale captured off the coast of Norway in 1719. Latin mottoes adorned doorways. And on top of cabinets, he balanced pieces of china decorated by his own heraldic flower,

Linnaea borealis, as well as Chinese shell arrangements and Spanish cork statuettes of a type sold to sailors, and depicting Africans covered by mussel-shells. Over the sanded, broad-planked floors, Linnaeus scattered his botanical manuscripts, where blinded nightingales splattered them with droppings and raccoons played and clawed among them. He dressed the ceilings in birdskins. And 'together with other curiosities' he hung his 'Lapp' costume (a trophy from the 1732 Lapland voyage) on the wall.

International fame

Philosophia botanica and the binomial nomenclature it recommended were received with enthusiasm. Reprinted ten times in Latin between 1755 and 1824, the book was also translated into English, Dutch, Spanish, German, French, and Russian. An abundance of Linnaean primers also appeared, often written by gardeners and 'empirics'. One prototype of the genre, James Lee's *Introduction to Botany* (1760), went through eight editions. A competitor, Philip Miller's *Short Introduction . . . to Botany* (1760), even reached fifteen editions. (Indeed, England especially celebrated Linnaeus.)

Numerous botanic dictionaries were also published. They were modelled on Linnaeus's own plant vocabulary, *Termini botanici* (1762), which was itself reprinted twenty-two times before 1811. By the 1760s and across Europe, local floras, botanic plate publications, natural histories of foreign countries, and even species monographs and children's books, now all used a Linnaean vocabulary. Linnaeus was a household word among the educated public, and a fashion spread across Europe for the botany he had made accessible to lay people.

In the 1730s and 1740s certain naturalists had suggested that Linnaeus's sexual system was immoral (J. Siegesbeck, St Petersburg), that he should return to Theophrastus (J. J. Dillenius, Oxford), or that he should instead develop an alphabetical taxonomy (Sir Hans Sloane, London). More importantly, at Göttingen, the eminent Albrecht von Haller (1708–77) advocated biogeographical criteria for classification. At Edinburgh the anti-sexualist school cast doubt even on the notion that plants had two sexes. And in Paris, Michel Adanson (1727–1806), counting in the preface to *Familles des plantes* (1763–4) over sixty natural botanic systems so far, went on to demonstrate (contra Linnaeus's sexual system) that no known single characteristic could satisfactorily divide plant groups.[17]

The century's most famous naturalist next to Linnaeus himself, Georges-Louis Leclerc de Buffon (1707–88), vigorously mocked his competitor in the 'Initial Discourse' (1749) of his celebrated *Histoire naturelle*. 'This large tree which you see is perhaps only a bloodwort. It is necessary to count its stamens in order to know what it is.'[18]

Through Denis Diderot and L. J. M. Daubenton, Buffon's condemnation became a commonplace in salons and in the *Encyclopédie*.[19] Julien Offray de la Mettrie even wrote a pornographic *L'homme plante* (1748), which was dedicated to Linnaeus and diagnosed a 'plant-woman' according to the sexual system.

Linnaeus in turn read his critics through 2 Samuel 7:9: 'And I . . . have cut off all thine enemies out of thy sight'. This biblical quotation he regarded as prophesying his eventual victory over that 'Frenchman named Buffon, who' (Linnaeus always dismissed the *comte* as a kind of gardener) 'lived in the Botanical Garden in Paris, as Inspector, and always wrote against Linnaeus'.

Linnaeus also became famous for wider cultural reasons. In his handbooks he condemned rhetoric, and he attempted to banish from his science the use of language as a means of persuasion or for emotional effect. *Philosophia botanica* explicitly bans tropes such as synecdoche, metaphor, and irony. This preference for a plain style is of course itself a rhetoric, related to Linnaeus's cultivation of himself as a 'Gothic' moralist opposed to all things courtly and French. Yet the neo-classicists, primitivists, and Romantics of the later eighteenth century were themselves at once nostalgic and stern, and in pursuit of an unmediated language of authenticity. They thus could claim Linnaeus as their precursor, even if his attacks on civilization derived from very different sources, namely his Lutheran and Carolingian childhood.

Thus it was for the moral qualities believed to be intrinsic to his botany that Linnaeus was so admired by Jean-Jacques 'Russau' (as Linnaeus, who was hazy on who he was, spelled his name). Rousseau's hugely popular *Lettres élémentaires sur la botanique*, written between 1771 and 1773 to educate a four-year-old girl, in turn molded the female fad for Linnaean botany in the later eighteenth century. It also inspired the Parisian Société d'Histoire Naturelle (founded by 'lovers of freedom' in 1790) to erect a statue of Linnaeus in the Jardin des Plantes, and thus symbolically to close off Buffon's reign.

In England, Erasmus Darwin's *The Botanic Garden, Part II: Containing the Loves of the Plants* (1789), dedicated to 'ladies and other unemploy'd scholars', was also important. And in Germany, Johann Wolfgang von Goethe, who himself was much taken by Rousseau's *Letters*, made debating Linnaeus a pastime in fashionable Romantic circles. Like Rousseau, Goethe carried *Philosophia botanica* along on his country walks. Goethe also claimed to have had only three teachers in life – Shakespeare, Spinoza, and Linnaeus – adding pointedly for the last, 'not however in botany!'[20] It was the provincial naturalist's anti-rhetorical stance, and his appeals to virtue, that appealed to Europe's most celebrated man of letters.

Religious beliefs

In 1739 Linnaeus gave the inaugural speech at the Swedish Academy of Science which he had just co-founded. It discussed the economy of nature by means of 'curiosities among insects', and on the model of the Lutheran sermon. Linnaeus subscribed to the natural theology of William Derham's *Physico-Theology or, Demonstration of the Being and Attributes of God from His Works of Creation* (1713) and John Ray's *Wisdom of God Manifested in His Works of Creation* (1686). Nature, he believed, was one single, self-regulating global entity. Since unchecked population growth would outstrip nature's sustaining capacity, the regulatory mechanism of natural equilibria was thus what he called 'a war of all against all' and regarded as embodied both in predator–prey relations and in general competition for resources. Linnaeus understood competition as taking place between, and not within, species. He also saw it as a principle of continuity, not of change.

At other times Linnaeus considered nature as only the animated setting for salvation history. Domesticating the wilderness, he believed, meant restoring it to an Edenic state. He could not grasp the real possibility of extinction of life-forms by human agency. From his doorstep, he placidly rejoiced in the wild fauna's self-evident and continuing presence as storks waded in his backyard ditch, and eagles (hunting hens) dove into his garden.

Yet in Linnaeus's days the North Atlantic heather moors were still spreading. He himself describes how, in a rainy Swedish countryside which goat-grazing was turning into a desert, he walked on sand dunes so large and so fast-moving that along the dune ridges there protruded from the sand the tops of still green and leafy tree canopies.

Still Linnaeus assumed nature to be indestructible. One of his students, describing Surinam's rain forests in 1755, agreed. 'I am sure, that this huge Hothouse will stand un-mutilated, as long as the earth [itself].'[21] In Linnaeus's eyes, too, 'the most wonderful [region] in the world' was Scania (south Sweden). For this grain-field desert, shaded only by a few coppiced willows and hornbeams, was, as Linnaeus fondly recalled, 'a plain without mountains, hills, stones, rivers, lakes, trees or bushes'.[22]

Linnaeus thus viewed nature as a prelapsarian paradise, containing within each nation all the natural productions necessary for a complete and complex economy. Yet why then did people suffer and even starve in the midst of this posited material plenty? In his spiritual diary *Nemesis Divina* (late 1750s), a testimonial to God's working in history, Linnaeus elaborated a bleak theodicy. Discounting miracles or indeed any benign divine intervention, he

collected some 200 case histories of divine retribution. Some stories linger over how unwed mothers, or 'whores', die by scaldings and burns, as if that was the appropriate end to their inflamed passions. Others chronicle how officers, themselves mutilated in battle, had mangled hapless civilians in drinking bouts. Yet others explained the sufferings of moral innocents (such as infants) by ancestral sins. Linnaeus also noted that a colleague who dared to argue with him at a faculty meeting, at that instant fell down in a swoon, to be carried home, a cripple from that day on.

With such punishments, Linnaeus additionally suggested, God's interest in humankind ceased. For, while idealizing nature, Linnaeus was less sure of man's role in it. He repeatedly asked whether he should 'call man ape or vice versa?'[23] (As a counterpart to *Homo sapiens*, he described a *Simia sapiens* that played backgammon.) He argued that animals possessed souls and that, conversely, humans were mortal. Immortality belonged solely to a personal entity he called 'the eternal force', 'the world soul', or 'nature', and understood as animated creation, put in place by a distant sky-god he called 'the wisdom' or 'the intention'.

Redemption, then, had no place in Linnaeus's faith. Linnaeus even suspected that God made nature for his own enjoyment, as a kind of toy, since otherwise he would have created the globe as 'an [edible] mass, wherein we would have ate and slept like the worm in the cheese'.[24] He bitterly noted that 'when [God] doesn't want to keep / us, / we are removed. / [He] let others be put in our place. / Thus nature dooms us, contra Theology'.[25] In his diaries the grief-stricken father also likened his dying children to 'snow crystals' and 'candle ends'.

On a more optimistic note, Linnaeus positioned his own natural science as a material theodicy, enabling humankind to harvest and prepare the natural productions of their homelands. Here he explained suffering, and especially Scandinavia's many famines, by ignorance. 'The sciences are thus the light that will lead the people who wander in darkness.'[26]

A parson's son in the fifth generation, Linnaeus analogized himself to a Luther of science. In a manuscript classification of naturalists, he entered next to the category '*Reformatio*' only two words – '*ego*' and '*mihi*'. In the same spirit, he divided botanists into 'heterodox' (non-Linnaeans) and 'orthodox' (Linnaeans). And he took 1 Kings 17:8, 'and the word of the LORD came unto him', to be a Biblical prophecy of his binomial nomenclature.[27] Linnaeus also likened himself to Moses on the mountain, and even, as on the frontispiece of the 1760 Lange edition of *Systema naturae*, to Adam. Collapsing time, he at once names the animals and writes the *Systema*.

Medicine and anthropology

Linnaeus's doctoral dissertation (Harderwijk, Holland, 1735), was on a medical topic, the cause of malaria. Between 1738, when he returned from Holland, and 1741, when he was appointed professor of medicine at Uppsala University, Linnaeus practised medicine in Stockholm, and was made the chief physician to the Swedish navy. He typically sought environmental roots of diseases, arguing for example that epilepsy was caused by washing one's hair, ergotism by eating radish seeds, and malaria by drinking muddy water.

Linnaeus was also deeply involved in questions of child-rearing. Together with his Uppsala colleague Nils Rosén von Rosenstein, a founder of paediatric medicine, he battled wet-nursing, baby farms, swaddling, and the doping of infants with gin. He described, with a furious sorrow, how he encountered small victims of physical abuse, 'lame, hunchbacked, or covered with runny wounds'.[28]

Later in life, Linnaeus felt that nature's division into male and female principles provided an overarching 'double key to medicine'. Earlier, however, he had argued that medicine should be 'taken from the principles of zoology . . . man is an animal and ought to live like an animal'.[29] Linnaeus rewrote Sweden's pharmacopoeia for mostly indigenous herbal simples, and he and his students carefully studied folk medicine, of both 'wild nations' (tribal people) and Scandinavian peasants. Thus, on his 1732 Lapland voyage, Linnaeus emphasized the indigenous remedies of Arctic people, and ignored the Sami's use of common Scandinavian medicinals such as tobacco, vodka, beaver glands, and a crude form of moxibustion. He noted instead their use of reindeer cheese for frost damage, birch bark for wound dressing, and milfoil for intestinal parasites.

Linneaus also metaphorized his zoological medicine as a 'return' to older and more 'natural' mores. This, he held, had the power of eradicating what he saw as a single whole: poverty, disease, ignorance, and sin. It was thus a materio-moral enterprise, conflating mind, body, and spirit. Broadly speaking, he envisioned a great chain, or universal scale, of health, reaching from 'wild nations' at the top, through European farmers and townsmen, to the lowest of all, French courtiers with their vile diseases.

Linnaeus's primary example of a 'wild nation' was the Sami, the indigenous people of Scandinavia's Arctic regions. They in fact suffered from colonial diseases such as alcohol addiction, and severe forms of measles and influenza. Linnaeus thus spent his 1732 Lapland voyage convincing himself, in spite of overwhelming evidence

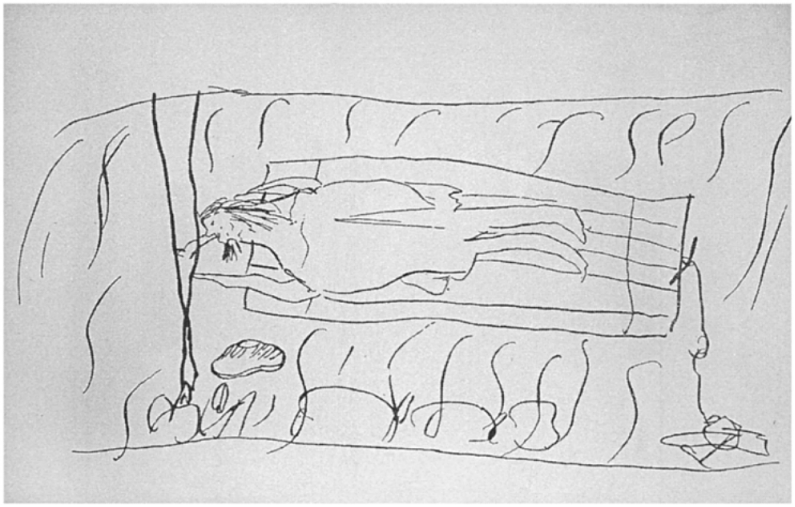

Figure 9.1 Here we see Linnaeus's clumsy attempt to portray a pearlfisher's craft, as he observed it at Purkijaur, Swedish Lapland, in 1732. Note the long wooden tongs with which the pearlfisher, lying on his craft, picks mussels from the bottom of the river. Ink on paper drawing in his Lapland diary, *Iter Lapponicum* (1732), in E. Ährling (ed.), *Carl von Linnés ungdomsskrifter* (Stockholm, 1888), p. 163.

to the contrary, that he had 'discovered' noble savages living in a natural state and a belated Ovidian Golden Age.

Since the Sami were Edenic beings, Linnaeus reasoned in turn, it followed that original sin was not all-pervasive. Neither Lutheranism (salvation by faith), nor Calvinism (salvation by grace), nor Catholicism (salvation by good works) applied. Instead, empirical field studies of 'the Lapps' customs, economy, diet, etc.'[30] could reverse both sin and disease among Europeans. In Linnaeus's hands, then, the noble savage became a token of a proximate salvation. Or, as he put it, 'The Lapps are our teachers'.[31]

Yet at the same time, Linnaeus's Lapland voyage aimed to eradicate the very possibility of this postulated new knowledge formation by cross-cultural mediation. He and his sponsors regarded the journey as an exercise in '*oeconomia*', or part of the ongoing exploitation of 'our West-Indies' (as Swedes called their Arctic frontier). And this colonial venture in turn was predicated on erasing indigenous culture, as the 'wild' Sami and their herds were chained to the engines of industry.

Reception history and conclusion

Linnaeus was given a grand funeral, on a dark winter's evening in 1778. 'His farmers, dressing in mourning, followed the carriage with torches.'[32] All over Europe memorial addresses were delivered at scientific academies. (They were composed, as was customary in the period, by Linnaeus himself.) Eulogies were published in both the scientific and the popular press.

Yet in his homeland, Linnaeus was largely forgotten after his death. Indeed, natural history itself declined. Linnaeus the

Figure 9.2 This illustrates Linnaeus's opposition of metaphor to plain description: one of the only two erotic drawings in his hand, and a plant description. Ink on paper drawing in his Lapland diary, in E. Ährling (ed.), *Carl von Linnés ungdomsskrifter* (Stockholm, 1888), p. 68.

Younger failed entirely at Uppsala University. Other ageing students turned into pedantic and provincial professors of 'practical economics' (as Scandinavian chairs of Linnaean natural history were named). The study of nature only rejuvenated a generation later, with the Scandinavian reception of German Romantic morphology.

Linnaeus's first public monument in Sweden was thus a modest funeral plaque placed in Uppsala Cathedral in 1798, twenty years after his death and eight years after Paris acquired a public statue. It remained his sole official commemoration until 1811. Linnaeus also fared badly within the historiography of his discipline. In 1875 the German plant physiologist Julius Sachs's famous *History of Botany* categorized Linnaeus as an Aristotelian essentialist. For the next hundred years, most historians of science agreed. In 1965 Linnaeus was even given a prominent role in 'two thousand years of [scientific] stasis'.[33]

Between the 1870s and the 1930s, however, Linnaeus's fame underwent a renaissance in Scandinavia. His place of birth was made into a museum in 1866, as were his country seat in 1879, his childhood home in 1935, and his town-house in 1937. 'Linnaeus liqueur' and 'Linnaeus cakes' were sold in cafés. Temperance lodges, cultural associations, and baby girls were all named after the great Swede, and poems, songs, and even a ballet were composed in his honour. His birthday, May 23rd, was pronounced 'Linnaeus Day' and sponsored by various state agencies as a national competitor to May 1st, International Workers' Day. Flags were flown, schools closed, parades arranged, and keepsakes manufactured. In a time of rapid industrialization, mass emigration, and widespread

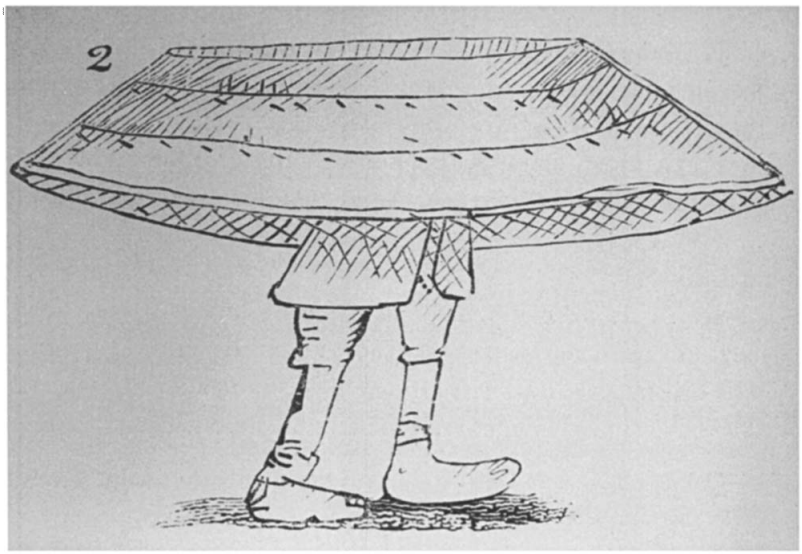

Figure 9.3 Linnaeus's ethnography illustrated by a rare drawing of a Same man carrying a canoe: note that 'Same' is the singular form of 'Sami'. Ink on paper drawing in his Lapland diary, in E. Ährling (ed.), *Carl von Linnés ungdomsskrifter* (Stockholm, 1888), p. 38.

social unrest, Sweden's conservative elites thus launched Linnaeus as a 'flower king' who recaptured in his science the victories won by Gustavus Adolphus in the Thirty Years War and Charles XII in the Great Northern Wars. Over time, such sentiments grew increasingly racialist, and the small, dark naturalist transmogrified into a blond and blue-eyed giant.

In the 1930s, and with the advent of a Social Democrat government, this cult of Linnaeus faded away. When a small town in his home region staged a 'flower march' for the 250th anniversary of his birth in 1957, Linnaeus was played by a schoolboy and placed on a tractor-drawn 'flower-float' next to a medieval saint, a Viking Amazon, and a magic midget. Further crowding the float were two 'Lapps' and 'a great many small school-children more or less disguised as flowers'.[34] Such marches hardly rekindled interest in Linnaeus. Nor was a second Linnaean renaissance inaugurated by the breathless tabloid rubrics of the 1960s, such as 'Linnaeus TV hero – if TV had existed',[35] 'Linnaeus – our greatest PR-man?',[36] and 'Not just flowers for the sex radical Linnaeus'.[37]

Linnaeus thus dwindled into a local hero whom (as a 1957 questionnaire revealed) people dimly recalled as a 'famous tee-totaller', and who was listed in tourist brochures alongside midgets and Amazons. This trajectory of reception may seem like a funnel, where the magisterial Enlightenment scientist diminishes into a small bronze statue of a pre-pubescent boy, gazing at a flower by the grass-roofed cottage where he was born. Yet as it grew ever more localized and localizing, Linnaeus's image also reflected a profound truth about him: he was from the start a quintessentially local man.

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