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LRB | 20 November 2008 | Steven Shapin 

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## Species-Mongers

Steven Shapin

- *Imperial Nature: Joseph Hooker and the Practices of Victorian Science* by Jim Endersby

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In the great adventures of botanical discovery from the 17th to the 19th century, expertise about plants was often supplementary cargo in voyages whose main purpose was to find, chart and conquer new lands. You planted the flag and then you named the plants. Making an inventory of the world's plants, learning where they grew (and where they could be made to grow), and figuring out what they were good for, were activities hugely dependent on the navies, armies and trading companies of the big imperial powers. The mutiny on the *Bounty* ruined a mission in imperial botany: Lieutenant William Bligh's task had been to secure breadfruit trees from Tahiti, then carry them to the Caribbean to provide cheap food for slaves on the sugar-cane plantations. (The trees got to the Caribbean on a second Royal Navy breadfruit voyage in 1793.) The theory of natural selection was also a by-product of empire: Charles Darwin went along for the ride on the survey barque HMS *Beagle* as unpaid gentleman's companion to the captain. Hydrography, meteorology and cartography in the aid of empire were the *Beagle's* missions, evolutionary theory its unintended consequence.

From the 18th century, botanists battled over the proper way to name and classify plants. The binary taxonomic system devised by Linnaeus in the 1750s was frankly 'artificial'. That is, its classifying criteria – the number and arrangements of the sexual parts of flowers – arbitrarily focused on a small portion of a plant's features and were not meant to reflect the patterns of relationship actually found in nature. The system was, instead, intended as a practical tool that would allow easy identification and global stability of reference. So, the shooting star I've got in my garden is, in Linnaean nomenclature, *Dodecatheon pulchellum*, where the first name is the 'genus' and the second the 'specific epithet'; you can tell it's *Dodecatheon* because of the number, size and pattern of petals, stamens (bearing the male organs) and pistils (the female bits), which you can check in any number of published 'keys'. At higher taxonomic levels, my plant is a member of the *Primula* 'family', and below the species there may be varieties (or sub-species). What count as varieties to some authorities are distinct species to

others – but we won't go into that now. Common (or garden) usage, by comparison, is a mess: you can take your pick between 'pretty shooting star', 'few-flowered shooting star', 'dark-throated shooting star', 'sticky shooting star', 'Cusick's shooting star', 'southern shooting star' and 'prairie shooting star'. Sometimes one or more of these names are used to refer to a different Linnaean species, so you usually have a referential reliability with the Linnaean Latin binomials that you don't have with the common names.

By the late 18th century, however, many botanists wanted to find a 'natural' classification – one that flowed from plants' overall morphology. The system of expert classification then really would reflect God's creative order; it would be objective and 'philosophical', not a mere pragmatic sorting device. In the first part of the 19th century, there were botanists who wished to stick with the Linnaean system and those who recommended a natural system. But there were many candidates for classificatory 'naturalness' and, in the meantime, even proponents of a natural system continued to use Linnaean sexual taxonomy whenever it suited them. Taxonomic purity was often announced as a goal, but plant naming and ordering was, and to a large extent remains, a hodge-podge.

Metropolitan botanists were keen to impose order on the ever expanding global stock of plant species; to establish their right, as experts, to impose order, and especially their particular conception of order; and to acquire the financial and material resources that would allow the massive project of expert ordering to proceed as quickly and efficiently as possible. The choice of taxonomic system and classificatory practice showed how insecure the social and cultural position of the botanical expert actually was: experts who couldn't agree on the basic principles of their trade might be regarded as no experts at all.

Botany was a peculiar sort of science. There were academically trained experts, and there were people – though only a few – who made a living as botanists in the 18th and early 19th centuries. But one of the apparent cultural strengths of botany was also a source of weakness. There were too many people, of too many different sorts, who had an interest in it: physicians through *materia medica*; horticulturalists through economic concerns; domestic gardeners and painters through aesthetic interests; natural theologians who ransacked botanic knowledge for proofs of divine attributes and intentions ('consider the lilies of the field, how they grow'); middle-class and aristocratic ladies for whom it was a desirable feminine 'accomplishment'. Then there were the globally distributed worthies who wanted the richness and particularities of their local flora to be formally acknowledged, and who sought personal recognition as

discoverers of new species. To have your Latinised name – or that of someone or something you wanted to honour – on a plant was a kind of immortality. The range of interest in plants was too varied, too widely dispersed and too culturally resonant for the taste of metropolitan botanists, and that heterogeneity made for problems in the stability of classification and in giving plants their proper names.

So the general problem of scientific authority presented itself to botanists in a special form. Botany was well down the scientific pecking order. Writing in 1859, T.H. Huxley observed that ‘the word “Naturalist” unfortunately includes a far lower order of men than Chemist, Physicist or Mathematician. You don’t call a man a Mathematician, deserving of his country’s reward, because he has spent his life getting as far as quadratics; but every fool who can make a bad species and worse genera is a “Naturalist”.’ And another biologist, Richard Owen, made light of herbarium work as ‘the attaching of barbarous binomials to dried foreign weeds’. Partly because of its association with more general economic and cultural concerns, partly because it was so widely conceived as merely classificatory, and partly because the still strong Linnaean taxonomic system was acknowledged to be artificial, expert botanists struggled to establish their claim to scientific authority and, especially, to secure support and legitimacy for something called ‘philosophical botany’, a real science, animated by systematic questions about the form and internal function of plants, and, especially, about the geographical and temporal relationships between plant species – a science that used microscopes and cytological techniques and paid as much attention to lowly liverworts as lovely lilies. But it was hard for the experts to impose their authority and practices, especially when there was often discord among them about basic matters of fact and the procedures for establishing these facts. Mid-19th-century botanists with good credentials could not even agree how many species there were in a country as well surveyed as Britain: one authority fixed the number at 1708, another at 1571, a third at 1285. In 1856, the *Edinburgh Review* gave this kind of dissensus as one of the reasons that systematic botany was held ‘in so much contempt’.

In few careers are the problems and opportunities of life as a botanist more visible than in that of Joseph Dalton Hooker. Hooker, who was born in 1817, was bred to the botanical purple: his father, Sir William Jackson Hooker, was Regius Professor of Botany at Glasgow University, and, later, the first full-time director of the Royal Botanic Gardens at Kew, a position to which Joseph succeeded on his father’s death in 1865. Before that, he had established his botanical authority through heroic travel. From 1839 to 1843, he was an assistant surgeon on HMS *Erebus*, which had been dispatched to the Antarctic to map magnetic declination and find the South Magnetic Pole – an

expedition which cost the most ever spent by a British government on a scientific endeavour. Hooker botanised with brio, vastly expanding European knowledge of the flora of the far south, and, on his return, securing government funding to produce a series of sumptuously illustrated volumes on the plants of the Antarctic, New Zealand and Tasmania.

Taking a break from his travels only long enough to get engaged (prudently, to the daughter of the Cambridge professor of botany), he put off marriage in favour of another epic voyage, this time to the Himalayas. His father got him a government commission of £400 a year – though Joseph later claimed to have lost money on the venture – and he shipped out in 1847 on the same boat that delivered Lord Dalhousie, the new governor-general of India. For three years, Hooker travelled through India, Sikkim, Nepal and Bhutan by foot, pony and elephant; climbed mountains up to a height of almost 20,000 feet (at which elevation he confessed he was a ‘gone coon’); tried (against vigorous opposition from the local rulers) to get into Tibet – and may have done so, since the borders were poorly defined; and seriously offended the Rajah of Sikkim, who suspected (rightly) that the British were trying to annex his lands, and had Hooker and his companion imprisoned until the British army secured his release by threatening invasion. Kew’s superb collection of living and dried rhododendrons owes much to this expedition, which precipitated the Victorian rhododendron craze. The publication of his seven-volume *Flora of British India* occupied Hooker from his return until practically the dawn of the 20th century. It was through work like this, Jim Endersby writes, that botany emerged as ‘one of the great imperial sciences’. That wasn’t the end of Hooker’s botanical travels: later trips took him to Syria, Lebanon, Palestine, Morocco and, at the age of 60, to the United States, from which Kew received a thousand new species, though Hooker was wearily unimpressed by the splendours of Yosemite.

*Imperial Nature* isn’t a biography: Jim Endersby is not much interested in the domestic aspects or later years of Hooker’s life, or even in his travels. For Hooker’s life and work, the best sources remain Mea Allan’s father-and-son biography, *The Hookers of Kew* (1967), Ray Desmond’s gorgeously illustrated ‘official’ biography, *Sir Joseph Dalton Hooker: Traveller and Plant Collector* (1999); and several fine recent essays by Richard Bellon which cover some of the same ground as Endersby and describe Hooker’s conception of what it was to be both ‘professional’ and ‘philosophical’. Richard Drayton’s *Nature’s Government: Science, Imperial Britain and the ‘Improvement’ of the World* (2000) remains the best study of the relationship between metropolitan botany and empire. What concerns Endersby is not the trajectory or texture of Hooker’s

life, or even the way that life can be used to document the imperial significance of Victorian botany, but the problem of authority in the work of naming, classifying and cataloguing the world's flora.

Expert authority was difficult to secure because the metropolitan botanist remained dependent on a global network of correspondents. You could travel all you liked, but you still had to come home to the metropolis to set the plant world in order, and when you got there you were dependent on receiving a constant stream of information and specimens (living and dried) from parts of the world which you either had not visited or had only superficially surveyed. You could say that Hooker knew the plant world, while his colonial correspondents knew only their small bit of it, but for Hooker-in-London, knowing the whole world meant knowing trustworthy sources at its margins. True, some colonial collectors expected to be, and were, paid for their work, but many others acted for love of botany. So a pre-modern 'gift relationship' was crucial to the making of a rational modern order, and the accumulation of botanical knowledge took place on a field of friendship.

Yet there were problems. The colonial periphery contained all sorts of admirable botanists, intimately familiar with the local flora, but they were not always competent in the techniques of collecting, drying, labelling and transmitting what they collected, and they often had curious ideas about what plants should be called and what counted as a species. A metropolitan botanist like Hooker had to keep colonial botanists in play, but, if he was to secure his own authority in naming and sorting, he could not just let them have their way. Colonial botanists were always trying to make new species, and to recognise discrete botanical entities, while Hooker urged them to see plant forms as varying on a continuum. 'Lumping' rather than 'splitting' was part of what it meant to be a 'philosophical botanist', and Hooker was aggressively philosophical. Working on the Indian flora, he wrote proudly that it was 'wild & exciting work, the species go smash smash every day.' 'My fate is to destroy species as I go on & the more carefully I examine the more to fell.' If the colonial splitters – Hooker disdainfully called them 'dirty species-mongers' – had their way, the philosophical order and tidy logic of species would be reduced to an incoherent jumble. How could you publish definitive flora if species multiplied out of control? Hooker complained that one Australian botanist was 'vomiting forth new genera & species with the lack of judgment of a steam dredging machine' and that another species-splitter had made 'a frightful mess of the Rhododendrons' and so had perpetrated 'crimes' against botany. The periphery intermittently fought back: a New Zealand correspondent worried that in its reduction of the number of species metropolitan lumping seemed to reduce the variety of the

local flora, and its dignity. Carrying on in this direction would ‘certainly end in this – the breaking up of all species & genera’, an outcome which would be neither ‘philosophical’ nor practical. But there could be little effective resistance against Hooker and Kew. The metropolitan botanist might lack the colonial’s direct access, but that was more than compensated for by huge material and institutional advantages that the Hookers had been building up at Kew, where Joseph had ‘the plant world spread out at his feet’, as Endersby writes. So, in the aphorism of Durkheim and Mauss, the classification of things came to reproduce the classification of men.

The authority to name, sort and order followed largely from the command of resources, and one of the strengths of *Imperial Nature* is the depth of information it provides on the everyday practices of Victorian botanists, at once humdrum and enormously skilful, conceptually undemanding yet as modernity-making as the work of any thermodynamicist or electrical engineer. Kew was not just a national garden but a vast filing system where dried and pressed plants were married to paper and arranged in drawers. Collected plants were of little use without the right drying presses and the right quantities and sorts of paper. Hooker had no problems obtaining these supplies: he sailed on the *Erebus* with an assortment of microscopes, ‘vascula’ (for containing and carrying specimens in the field), ‘Wardian cases’ (for transporting living plants large distances), screw presses (for drying them) and 12,500 sheets of three different kinds of paper – a soft blotting paper used in the initial drying process, ‘brown’ for later stages of drying, and a high-white ‘cartridge’ paper for mounting and drawing. Compared to the instrumentation of the physical sciences, this was humble technology, but colonial botanists often lacked such things, and, for that reason alone, Hooker and his metropolitan colleagues could reject their submissions. Damp tropical conditions could turn the wrong sort of paper mouldy and ruin the specimens. Drying techniques that worked for sedums might not work for seaweeds, and colonial collectors, learning what Kew expected of them, sometimes offered abject apologies for the state in which their dried plants were shipped or received. Colonials collected but metropolitan botanists collated, and at Kew Hooker was building up London’s second great herbarium – a rival to the dead plant collection of the British Museum.

The emergence of institutions that gave plant species standard names, recognised and used on a global scale, bears a family resemblance to some better known projects in modern metrology – the development of standard measures of time, temperature and length, of electrical phenomena, of the composition of drugs and of the nomenclature of mental disorders. In order to do this work, botanical expertise had to be adequately supported, and although, up to the middle of the 19th century, it was possible to do

serious natural history on a private income – as Darwin did – by the later part of the century the state was presumed to be the paymaster. Why should the state pay? And what arguments could the metropolitan botanist use to urge the state to do so? Here, too, institutions like Kew were key. If you could decide what sort of place Kew was, you could at the same time settle problems to do with scientific authority and the scientific career.

Kew Gardens contained an unstable mixture of different sorts of people and purposes. It was a centre of taxonomic and bio-geographical research – which was what Hooker most wanted to do – and it was also a major site for work in economic botany, and that was much closer to what the government wanted Kew to do. If Hooker's heart was not in assisting British and colonial farmers and gardeners, he nevertheless appreciated that his ability to do 'philosophical' science depended importantly on displays of the commercial usefulness of botanical knowledge. So Hooker knew that he needed to showcase Kew's role in transplanting tea bushes, rubber and cocoa trees to new colonial habitats, even trumpeting the transplantation of the quinine-containing *Cinchona* tree and the emetic ipecacuanha shrub to India, though neither was very successful. Kew was also a pleasure garden. By the mid-1870s, it had almost 700,000 visitors a year, and on one day alone in 1877, 58,000 people went there. But Hooker resented having to construct floral displays for 'mere pleasure or recreation seekers . . . whose motives are rude romping and games'.

Hooker was criticised for his resistance to making Kew more accessible to the public. Hoi polloi were banned until 1 p.m. every day to permit the staff to pursue serious scientific work: research would be hampered, Hooker said, if 'swarms of nurserymaids and children' were allowed in before lunchtime. He was also criticised for not making Kew more accountable to government supervision and interests, and in the 1870s had to fight off proto-Thatcherite attempts to make the gardens more useful, more cost-efficient and more responsive to state needs. (The imposition of an 'audit culture' on British science has a long history.) In 1878, a gardeners' magazine denounced Hooker for subjugating public aesthetic and recreational pleasure to private scientific pleasure. Some said Kew was just a family plaything: 'For years Kew Gardens have formed a snug little preserve – a sort of happy hunting ground for the scientifically inclined members of the Hooker family.' (In 1885, its direction was taken over by Joseph Hooker's son-in-law, William Thiselton-Dyer.)

The directorship of Kew may have seemed nepotistic jobbery to some, but it was the plum position in British botany – no 'better scientific place exists in the world', Hooker wrote. Kew gave Hooker immense scientific authority and the material resources to

exercise that authority. More than that, it provided a decent living – and Hooker, unlike Darwin, needed to earn a salary. Endersby makes a rather heavy-handed case for the significance of Hooker's ambiguous gentility in securing his scientific authority and his career – though the Hookers, with their roots in East Anglian land and brewing, were hardly skint or poorly bred. (Compared to his scientific peers Michael Faraday, Herbert Spencer, Alfred Russel Wallace and T.H. Huxley, Hooker's background was quite comfortable.) But Endersby is right about one thing: Hooker's life provides a vantage point for appreciating the momentous shift during the 19th century from science seen as an avocation to science seen not merely as a job, but as a job deserving of state support. The lilies might not 'toil or spin', but the lily-expert definitely reckoned that he was a labourer worthy of his hire.

'I am a *rara avis*,' Hooker wrote in 1853 to a wealthy botanical friend, 'a man who makes his bread by specific Botany, and I feel the obstacles to my progress as obstacles on my way to the butcher's and baker's. What is all very pretty play to amateur Botanists is death to me.' Years later, Hooker was still complaining that 'I was 16 years before I had an average income of £100 clear from my Science . . . It was not until 1855 that I was independent of my father!' At the same time, he acknowledged how much had changed since he shipped out on the *Erebus* in 1839 on a salary of £130. Scarcely thirty years later he wrote that '*positions* and means of scraping together a livelihood have multiplied.' But they had multiplied only if one was willing to be accountable to the state. Writing home to his father from India in 1850, Hooker showed how well he grasped the new order of things: 'Once home, & I work *for money* & only for government if government will feed me & house me.' The paymasters – often reluctantly – agreed to pay the bills for disinterested inquiry because they came to believe that something useful would ultimately emerge from it. (What use was the newly discovered phenomenon of electromagnetic induction, Faraday was supposedly asked by the cost-cutting Gladstone: Faraday said he didn't know, but 'soon you will be able to tax it.') The acceptance that governments should pay for scientific inquiries because of their likely material usefulness is commonly ascribed to the commercial and military utility of chemistry in World War One and, especially, of physics in World War Two. But a major source of that acceptance was the imperial botany of the late 18th and 19th centuries.

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