

# Joseph Hooker: the making of a botanist

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Joseph Hooker became one of the most influential botanists of his day. He is best remembered as a friend of Charles Darwin and an early advocate of natural selection. However, after returning to Britain from his first major voyage, Hooker spent years struggling to find a paid position that would allow him to pursue his studies of plant classification and distribution. As he worked to establish himself, he also helped transform the status of botany as a discipline. In all his efforts, Hooker relied on a network of unpaid, colonial collectors, whose often-forgotten contributions to Victorian natural history are vital to the understanding of the professionalisation of the sciences in the 19th century.

On the 30th September 1839, Her Majesty's discovery ship *Erebus*, accompanied by its sister ship the *Terror*, set sail from England headed for the Antarctic (Figure 1). Among the 64 men on board was Joseph Dalton Hooker, 22 years old and newly qualified as the ship's assistant surgeon and the expedition's botanist. It would be 4 years before he saw Britain again.

Before he set sail, Hooker received a present from Charles Lyell senior (father of the geologist); knowing of Joseph's passion for traveller's tales, Lyell sent him the proofs of Charles Darwin's *Voyage of the Beagle*. As he waited to set sail, Joseph slept with Darwin's words under his pillow and read them every morning. He was, he recalled later, a little overwhelmed by the 'variety of acquirements, mental and physical, required in a naturalist who should follow in Darwin's footsteps', but he hoped to do so nevertheless and make a name for himself as a naturalist<sup>1</sup>.

Hooker was not the only one who saw Darwin as a role model; James Clark Ross, the commander of the *Erebus* and *Terror* expedition, had told Hooker that he wanted 'such a person as Mr. Darwin' as the expedition's naturalist. However, Ross felt Hooker had not yet proved himself of Darwin's calibre and so appointed him to the inferior position of botanist, rather than naturalist. After receiving this unwelcome news, Hooker wrote a disgruntled letter to his father, complaining 'what was Mr. D. before he went out? he, I daresay, knew his subject better than I now do, but did the world know him? the voyage with FitzRoy was the making of him (as I hoped this exped. would me)<sup>2</sup>.

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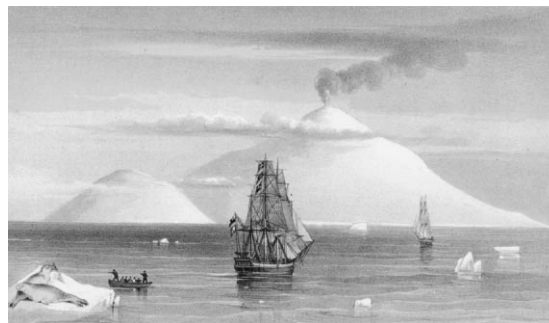


Figure 1 The *Erebus* and *Terror* in Antarctica (engraving from Ross, J.C. *A voyage of discovery and research in the southern and Antarctic regions during the years 1839–43*, John Murray, London. Reproduced by permission of the Syndics of Cambridge University Library).

Hooker's hope that the voyage would be 'the making of him' was inspired by the realisation that Darwin, like himself, had been an unknown young man when the *Beagle* set sail under Captain FitzRoy, yet had returned 5 years later ready to take his position in Britain's scientific world. Hooker hoped to establish his own scientific reputation by collecting during the voyage and then publishing books such as Darwin's *Coral Reefs* and the *Journal of Researches* when he returned.

Travelling was one of the main ways in which people like Hooker and Darwin could establish themselves as serious men of science. There were no science degrees on offer until much later in the century, nor were there any established scientific career paths. Instead both men had to invent professional roles for themselves and the long, uncomfortable years on board ship were the first step in this process. However, Hooker, unlike Darwin, did not have a wealthy father who would leave him enough money to live on for the rest of his life; he needed to find a way to earn his living while pursuing his passion for botany. As he noted in a letter to his father, 'I am not independent, and must not be too proud; if I cannot be a naturalist with a fortune, I must not be too vain to take honourable compensation for my trouble.'<sup>3</sup>



Figure 2 Ronald Campbell Gunn. Reproduced with permission from Kew Gardens.

#### 'a great attraction'

The *Erebus* and *Terror* voyage was primarily concerned not with botany, but with trying to ascertain the precise position of the Magnetic South Pole. However, although the ships had specially strengthened hulls to withstand the Antarctic pack ice, they had to shelter during the winter in places such as New Zealand and Tasmania. They also visited the numerous tiny islands around Antarctica, which allowed Hooker to collect plants in relatively unexplored regions. As he wrote to his father, 'No future Botanist will probably ever visit the countries whither I am going, and that is a great attraction.'<sup>4</sup>

It was during the voyage of the *Erebus* that Hooker conceived the idea of publishing floras, not just of Antarctica and the surrounding islands, but of the plants of the southern oceans more generally, by including floras of Tasmania and New Zealand. Apart from the prestige that such publications would bring him, Hooker was fascinated by the distribution of plants in the Southern Oceans. As he sailed and collected, he noted that lands close to each other did not always have similar plants: for example, the gum trees (*Eucalyptus*) and wattles (*Acacia*) that dominated the Australian landscape were never found in New Zealand. By contrast, the plants of the tiny island of Kerguelen's Land were clearly related to those of distant Tierra del Fuego, and not to those of Lord Auckland's islands – despite the latter being much closer<sup>5</sup>. Hooker, like many of his contemporaries, assumed that each species had been created, by some unknown means, in one place only and that plants then migrated from their point of origin to the various places they came to occupy. However, this theory was hard to reconcile with members of the same group being

found thousands of miles apart with no obvious, natural means of transport between the locations. Hooker hoped that studying the southern floras in more detail might shed some light on these puzzles and, perhaps, on the mysterious mechanism by which new species were initially created.

Apart from the need for prestigious publications that would establish his reputation, Hooker had another motive for investigating plant distribution. In his day British botany was mainly concerned with taxonomy, the naming and classifying of plants. In the eyes of some 19th century men of science, this was not enough to qualify botany as a science; sciences were supposed to be about mathematics and experimentation, accuracy and precision, but, most of all, they were supposed to be concerned with laws. The leading British philosophers of science – men like John Herschel and William Whewell – regarded Newtonian mechanics as the pinnacle of scientific achievement<sup>6</sup>. Newton had discovered a few simple laws that explained everything from the fall of a stone to the motions of the planets; by comparison, botany seemed as intellectually demanding as stamp collecting.

Hooker was acutely aware that his beloved science lacked anything that looked like the laws of physics, but he (like several of his contemporaries) hoped plant distribution studies would offer them the chance to discover such laws. The southern floras seemed particularly good ones to study, judging by the achievements of the British botanist Robert Brown, who had published the first work on Australian plants in 1814 (Ref. 7). It was obvious to Brown, as to all European travellers, that the tropics were rich in species – the lush, green rainforests were unmistakable evidence of that. As one sailed south the plants became fewer until one reached Antarctica where there were no green plants at all (and the same thing happened as one sailed north to the Arctic circle). So far, so obvious. But what Brown noticed was more interesting: as he travelled, the mathematical ratios between specific groups of plants seemed to change in a predictable way. The tropics were not merely rich in species, but their vegetation was characterised by genera that contained many species<sup>8</sup>. (A genus, the singular of genera, is the next step up from a species in the hierarchy of classification. Human beings, for example, are classified as *Homo sapiens*: 'Homo' is our genus and 'sapiens' our species. *Homo* is a very small genus, it contains only one living species and a handful of extinct ones. By contrast there are genera that contain hundreds or even thousands of species.)

Brown observed that the decline in the numbers of species as one sailed away from the equator was characterised by other factors, such as a decline in the size of genera (measured by the number of species each contained). His method of calculating these ratios became known as botanical arithmetic and his ideas were enthusiastically taken-up by the German scientific explorer Alexander von Humboldt. Humboldt travelled extensively in South America, where he observed that

Brown's ratios applied not only to changes in latitude, but also to changes in altitude: as one ascended the great mountain chains of South America the lush vegetation of the tropics gave way to a sparse, alpine flora that looked just like the plants of the icy southern tip of the continent<sup>9</sup>.

### An empire of plants

Hooker was an enthusiastic devotee of botanical arithmetic and hoped that it could be used to develop plant distribution into a rigorous study, one that would eventually lead to the discovery of the laws that explained why particular plants grew where they did. These laws would not only be fascinating in themselves but would have practical applications too, because the British Empire was built not just on industry but also on plants. Hundreds of plant products were vital to the empire's wealth: rubber, cotton, timber, grains, sugar, tea, oilseeds, spices, indigo, fruit and nuts were just some of these. Understanding plant distribution would allow botanists to predict where valuable, new plants could be found and also to know which plants could successfully be transplanted to new countries where they could be cultivated profitably<sup>10</sup>.

So, Hooker's plan to publish the botany of his voyage was not merely about raising his own status, so that he could earn a living from botany, but also about raising the prestige and status of botany itself, so that it could take its place alongside the prestigious physical sciences.

When it came to implementing his ambitious publishing plan, however, Hooker had both good and bad news. The bad news was that, although he had spent several months in Tasmania in 1840 and 1841 (when he had also visited New Zealand), and had travelled and collected as much as he could during those visits, he knew he did not have enough plants for the kind of comprehensive survey he wanted to write. Fortunately, the good news was that Hooker had a major asset he could use: his father, Sir William Jackson Hooker. William was also a botanist and had taught his son much of what he knew. Even more usefully, he was director of the Royal Botanic Gardens at Kew, and possessed one of the largest private herbariums (collections of dried plants) in the world. Using his father's influence, Joseph was able to get money from the Admiralty to help pay for his proposed publication and was able to use William's vast collections of dried plants, together with the living collections at Kew, to supplement the ones he had made on the voyage.

However, perhaps the biggest asset William had to offer his son was a global network of collectors who sent him plants from all over the world. Joseph met some of his father's correspondents while he was on his voyage: in Tasmania he befriended Ronald Campbell Gunn (Figure 2), the island's superintendent of convicts, who collected plants enthusiastically in his spare time; and in New Zealand, Hooker met the Reverend William Colenso (Figure 3), a missionary printer who, like Gunn, pursued botany as a pleasant diversion from the rigours of his work<sup>11</sup>.

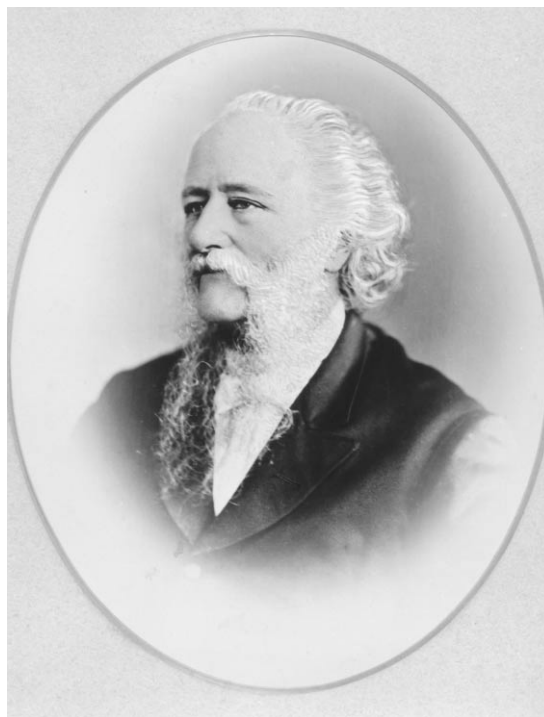


Figure 3 Colenso sent this hand-coloured photograph of himself to Hooker as a present c.1873. Reproduced with permission from Kew Gardens.

People like Gunn and Colenso were eager to send plants 'home' to Britain, conscious of the economic and scientific importance of their actions. They became essential to Hooker's project and he wrote them dozens of letters, praising or criticising their collections, offering hints, issuing instructions and asking them to look for specific plants (Figure 4). Given that he didn't pay them, it was not always easy to get them to collect in the way he wanted, despite the fact he had formed warm friendships with both men during the voyage of the *Erebus*. Hooker was, for example, sometimes frustrated by Gunn's tendency to collect mainly the larger flowering plants, and to neglect their smaller, less conspicuous relatives – the ferns, mosses and fungi that were collectively known as the lower plants or cryptogams<sup>12</sup>. Gunn complained that 'I have not got such a confounded microscopic eye as you have to detect differences'<sup>13</sup>, but Hooker continued to encourage his correspondent to look at these smaller plants:

you have collected so ably & well that there cannot be a large amount of Phaenogamic [flowering] plants yet to be discovered, & we have as many duplicates of most as we know what to do with, I would therefore beg particularly to call your attention to the smaller things & lower orders, which can only be collected well by obtaining a little practical knowledge of their structures.<sup>14</sup>

To encourage Gunn, Hooker sent him numerous presents of the botanical books and magazines that the Tasmanian always asked for. These gifts were usually accompanied by long, friendly letters and praise for Gunn's collections (in one letter, he sent Gunn '10000 thanks' for his 'splendid specimens').



Figure 4 *Pultenaea Gunnii*, one of the numerous Tasmanian plants which Hooker named after Gunn. Colour plate from the *Flora Tasmaniae* (Ref. 5). Reproduced by permission of the Syndics of Cambridge University Library.

#### 'From having no Herbarium'

By contrast, Colenso presented Hooker with rather a different problem. The New Zealander was more than happy to collect cryptogams and was passionate about ferns in particular. However, Colenso fancied himself as a serious botanist and wanted to give names to any new species he found (Gunn, by comparison, was usually happy to leave such matters to Hooker). Colenso's ambitions put Hooker in a bind because he wanted to restrict the right of naming species to experts based in the centres of European science – men such as himself. Hooker claimed that the colonists could not name their own plants because the colonies did not possess large herbariums or reference libraries at this time; as a result, someone like Colenso could not be sure that the plant he was naming did not already have a name. Knowing the same species by two different names was a source of tiresome confusion, especially for someone like Hooker who was trying to survey the plants of many countries. In 1854, he criticised Colenso's attempt at naming some supposedly new species of New Zealand ferns: 'From having no Herbarium' wrote Hooker, 'you have described as new, some of the best known Ferns in the world.'<sup>15</sup>

However, there was more to Hooker's complaint than an unnecessary duplication of plant names. Dedicated, part-time botanists like Colenso and Gunn were fairly common in both Britain and its colonies during the early 19th century. Botany was considered a pleasant recreation that permitted its devotees to get some wholesome exercise while improving their minds. For clergymen like Colenso, the study of nature was often seen as the study of God's handiwork, a pious recreation that confirmed the existence of wise and benevolent creator. Given botany's

wholesome image, it is perhaps not surprising that large numbers of women were also devoted to the study of plants; botany seemed a natural accompaniment to such traditional feminine pursuits as watercolour painting and flower arranging.

For Hooker, however, these hordes of willing aficionados were something of a mixed blessing: while their collections were essential, how was a serious, philosophical naturalist like himself to ensure he was not confused with the well-meaning amateurs? Even worse, the popularity of botany, particularly the number of women who enjoyed it, probably contributed to its low standing in the eyes of some men of science. Trying to restrict the right to name species to metropolitan gentlemen like himself was part of Hooker's strategy for forging a professional identity that would distinguish him clearly from the amateurs. Setting himself up as a botanical expert was, as we have seen, no easy task in the days before the formal structures of professional science existed. Persuading the colonial botanists to accept his authority and cede the right to name plants to him was, along with publishing his books, another key step in making himself into a professional.

Hooker dealt with Colenso's botanical ambitions by giving in as much as he could while ignoring the New Zealander's desire to name plants. Hooker helped Colenso to join several of London's prestigious scientific societies, such as the Royal and Linnean Societies. As in Gunn's case, Hooker's numerous, affable letters were accompanied by gifts of microscopes, books and personal photographs. And, although Hooker would not allow Colenso the right to name plants, he did name several species after his New Zealand correspondent (Figure 5).



Figure 5 *Alsophila colensoi*, one of the many species of New Zealand plants that Hooker named after William Colenso. Colour plate from Hooker, J.D. (1855) *Flora Novae-Zelandiae* (*Botany of the Antarctic voyage: volume 2*), Lovell Reeve. Reproduced by permission of the Syndics of Cambridge University Library.



Figure 6 Joseph Dalton Hooker in 1869, just after he became director of Kew. This *carte de visite*, signed by Hooker, was a gift to R.C. Gunn. Reproduced with permission from the National Library of New Zealand, Wellington, New Zealand.

The importance of the colonial collectors to Hooker can be gauged by that fact that he dedicated the *Flora Novae-Zelandiae* (1855) to Colenso and the *Flora Tasmaniae* (1859) to Gunn. In both cases, the honour was shared with other colonial collectors, but the men Hooker thanked were only the most prominent members of his networks: there were dozens of others, including several colonial women, whose names and contributions are largely forgotten.

## Conclusion

The three volumes of Hooker's *Botany of the Antarctic Voyage* – the floras of Antarctica, New Zealand and Tasmania – took him more than 15 years to complete. He began publishing the first volume (which, like many scientific books of the 19th century, appeared in regular parts and was sold by subscription) in the 1840s, but as the work continued and he still could not find a permanent paid position, he broke off publication and went on another government-sponsored expedition, this time to explore the Himalaya. In 1855, he finally got a permanent, paid position as deputy director of Kew and worked alongside his father for 10 years. When Sir William died in 1865, Joseph took over as Kew's director (Figure 6) and by the time he retired in 1885, was one of Europe's most influential and highly respected botanists. He had also helped to transform botany from being the province of lady amateurs into the 'big science' of the 19th century. The voyage to the Antarctic had, indeed, been the making of him, although it taken many years.

Hooker is best known today as a friend of Darwin's and an early supporter of his theory of evolution. As a result, the significance of his own work has often been overlooked. Historians have long recognised the controversy

over Darwinism as the crucial context in which the role of the modern, professional scientist was formed. However, the colonial background of the natural historical sciences in the mid 19th century has not been given as much attention. Understanding how the networks of colonial collectors worked and the sometimes delicate negotiations that were required to keep them working, are essential to building-up a fuller picture of the making, not just of Joseph Hooker, but of the role of the professional scientist.

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- 12 Fungi are, of course, not plants at all and are now classified as a separate kingdom, however their study was considered part of botany in the 19th century
- 13 R.C. Gunn to J.D. Hooker, 17 October 1845 (original in Archives of the Royal Botanic Gardens, Kew)
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