J. Soc. Biblphy nat. Hist. (1980) 9 (4): 515–525

Charles Darwin's plant collections from the voyage of the *Beagle*

By DUNCAN M. PORTER

Department of Biology,
Virginia Polytechnic Institute & State University,
Blacksburg,
Virginia 24061, U.S.A.

The much-celebrated voyage of H M S *Beagle* began at Devonport, after several false starts, on 27 December 1831. The *Beagle* returned to England at Falmouth on 2 October 1836, having been gone four years and 279 days, a long trip even for those times. During this extraordinary surveying voyage, Charles Darwin (1809–1882), as the *Beagle's* naturalist, made many geological, zoological, and botanical collections and observations.

Darwin had received training in the natural sciences during his two years at Edinburgh University (1825–1827), and his interest therein lay mainly in zoology, particularly with marine invertebrates. This training continued at Cambridge University (1828–1831), where one professor stands out in his influence on the young Darwin: the Reverend John Stevens Henslow (1796–1861), Professor of Botany. Darwin attended Henslow's lectures on botany, 'and liked them much for their extreme clearness, and the admirable illustrations; but I did not study botany.'[1]

Henslow's influence was not in teaching Darwin to be a botanist, but rather as a friend who introduced him to the wider world of science and scientists. Following his graduation from Cambridge,[2] it was Henslow who persuaded him to study geology, and who asked Adam Sedgwick (1785–1873), the Woodwardian Professor of Geology, if Darwin might accompany him on a geological field trip to North Wales. Darwin had not attended Sedgwick's 'eloquent and interesting' lectures because of his experience with the 'incredibly dull' lectures on geology and zoology of Robert Jameson (1774–1854), Regius Professor of Natural History at Edinburgh.[3]

Darwin undertook his field studies in Wales with Sedgwick just prior to embarking on the *Beagle,* and throughout the voyage (and afterward) referred to himself as a geologist.[4] His primary interest in geology on the voyage is borne out by the voluminous geological notes and large number of collections he made. The geological notes total 1383 pages, almost four times as many as those on zoology (368 pages).[5] Reading Lyell's *Principles of geology*[6] had an acknowledged profound effect on Darwin during the voyage. The first volume was given to him prior to their leaving by Captain Robert Fitz-Roy (1805–1865), the second was sent to him by Henslow in 1832.

When one reads Darwin's notes, letters, and diary written on the voyage, which are variously at the Cambridge University Library, Down House, and the Royal Botanic Gardens, Kew, one cannot help but gain the impression that he was most interested in geology, somewhat so in zoology, and least so in plants. In a letter to Henslow from Rio de Janeiro early in the voyage (18 May 1832), he writes: 'Geology & the invertebrate animals will be my chief object of pursuit through the whole voyage.'[7] Indeed, in his autobiography[8] Darwin stresses

investigating the geology of all places visited and of collecting animals, but he is silent on the subject of botany.

There are no known separate series of notes on plants like those that he made for geology and zoology now at the Cambridge University Library. The only notations concerning his plant collections, besides remarks in his diary and letters, are to be found in his field notebooks, where they are intermingled serially with the notations regarding zoological and geological specimens also collected on his journeys. These small pocket notebooks, which Darwin carried with him on his travels to record specimens collected and observations, are now at Down House.

'The note-books contain mainly geological notes, varying from about half to as much as nine-tenths of the entries in different books.'[9] There are twenty-two notebooks in total.[10] Fourteen deal with inland travels, two are rough drafts of geological papers and miscellaneous notes, and six are catalogues of specimens collected during the voyage. Three or four additional notebooks, including those from Australia and New Zealand, appear to have been lost.[11]

The field notebooks served as the source materials for Darwin's more expanded geological and zoological notes, discussed above. These notes, in turn, served as the bases for the five volumes published on the zoology of the *Beagle,*[12] and the three volumes on the geology.[13] More recently, they have provided us with Darwin's ornithological notes.[14]

Lest the reader gain the idea from the foregoing that Darwin entirely neglected botany on the voyage of the *Beagle*, rest assured that he did not. In the beginning it may be said that he did not pay especial attention to plant collecting. Yet even at two of the first landfalls, Santiago in the Cape Verde Islands and the Abrolhos Archipelago off Brazil, he estimated that he collected nearly all the flowering plants of these islands coincident with his geologizing.[15] Darwin began to collect plants in ernest only following a letter from Henslow of 15 January 1833,[16] which was sent after his first plant specimens and seeds reached Cambridge. In this letter, Henslow gave Darwin some sound advice on collecting and pressing plant specimens.

Darwin previously wrote (15 August 1832): 'As for my plants, 'pudet pigetque mihi [it shames and disgusts me] .' All I can say is that when objects are present which I can observe & particularize about, I cannot summon resolution to collect where I know nothing.'[17] In answer, Henslow stated in his letter of 15 January: 'Most of the plants are very desirable to *me.*'[18] Darwin, however, did not receive this answer until July 1834, a year-and-a-half after it was written.

In a later letter (31 August 1833), following the arrival of further specimens, Henslow wrote: 'The plants delight me exceedingly, tho' I have not yet made them out – but with Hooker's work and help I hope to do so before long'.[19] Hooker was William Jackson Hooker (1785–1865), at that time Regius Professor of Botany at Glasgow University, who, as we shall see, played a vital role in our story. To this, Darwin answered (March 1834): 'I am very glad the plants gave you any pleasure, I do assure you I was so ashamed of them, I had a great mind to throw them away; but if they give you any pleasure I am indeed bound, & will pledge myself to collect whenever we are in parts not often visited by Ships & Collectors.'[20]

The majority of the plant collections appears to have been made after this letter was penned, particularly in southernmost South America and the Galápagos Islands. Two months

before arriving at these islands, Darwin wrote to his cousin William Darwin Fox (*ca* 1805–1880) from Lima, Peru (July 1835): 'I look forward to the Galapagos with more interest than any other part of the voyage.'[21] Although this enthusiasm was for geological and not biological reasons, Darwin certainly is better known today for his biological observations on the archipelago, rather than the geological.

In January 1836 he wrote Henslow from Sydney: 'I last wrote to you from Lima, since which time I have done disgracefully little in Nat. History; or rather I should say the Galapagos Islands, where I worked hard. – Amongst other things, I collected every plant, which I could see in flower, & as it was the flowering season I hope my collection may be of some interest to you.'[22] Darwin did an admirable job of collecting in these islands, particularly considering that it was *not* the best time of year for flowers. In six weeks, he gathered 173 taxa, twenty-four per cent of the presently-known flora.

Prior to the voyage, Henslow agreed to receive Darwin's collections as they were sent back from the *Beagle*. Darwin wrote him on 18 October 1831: 'I have talked to everybody: & you are my only resourse; if you will take charge, it will be doing me the greatest kindness. – The land carriage to Cambridge, will be as nothing compared to having some safe place to stow them; & what is more having somebody to see that they are safe. – I suppose plants & Birds-skins are the only things that will give trouble: but I know you will do what is proper for them.'[23] So, even before embarking, Darwin was anticipating the collection of plants. As was true for Darwin's other expenses on the voyage, payment for shipment of the specimens from their point of arrival in England (Falmouth, Liverpool, or Portsmouth) to Cambridge was borne by his father, Dr Robert Darwin (1766–1848) of Shrewsbury.

Henslow's parting advice to Charles Darwin was, 'With a little self denial on your part I am quite satisfied you must reap an abundant harvest of future satisfaction.'[24] Prophetic words, indeed!

During the voyage, Darwin shipped to Henslow nine or ten consignments of specimens from South America, including over a thousand (mostly animals) preserved in 'spirits of wine'. Collections made since the last shipment, sent from Chile in June 1835, including those from the Galápagos Islands, were taken home on the *Beagle*.

Not all of Darwin's carefully gathered plant specimens reached Cambridge, however. Of a gale off Cape Horn in 1833, when the *Beagle* was unsuccessfully attempting to enter the Pacific Ocean, Darwin wrote to Henslow (11 April 1833): 'A sea stove one of the boats & there was so much water on the decks, that every place was afloat; nearly all the paper for drying plants is spoiled & half of this cruizes collection'.[25]

It is not known for sure whether Henslow agreed to identify Darwin's plants prior to the *Beagle's* departure. He may have done so simply because he had urged Darwin especially to collect plants. Identification proved a formidable task for one conversant only with the British flora, so as we have seen, Henslow sought help from his friend Prof. William Hooker. This is not surprising, as at this time Hooker and George Walker Arnott (1799–1868) were publishing their series of papers on 'Contributions towards a flora of South America and the Islands of the Pacific'. A few of Darwin's collections found their way into this series, including *Senecio darwinii* Hook. & Arn., described by them from Patagonia in 1841.[26]

Although Henslow wrote Darwin on 31 August 1833 that Hooker would help him with the identifications, over two years later (24 November 1835) he wrote Hooker: 'So soon as I have done with proof sheets of my little vol. in Lardner & have looked over & distributed

my annual aquisitions in British Botan. I mean to have a regular attack upon Darwin's plants, & will send you specimens of all that I can.'[27]

By 21 January 1836 Henslow had prepared a package of specimens for Hooker: 'If you will have the goodness to name for me those which I now send I shall be able to get on rapidly with the collection – . . . I should like to get my list complete by Darwin's return if possible as he will then I doubt not begin to think of publishing his voyage & if there is any thing new among his plants would like to mention it – Your experience will enable you at a glance to suggest the specimens which are probably new – . . . I wish he had put up more duplicates than I find he has – but as his chief pursuit was Zoology & Geology I must be satisfied with what he has sent me.'[28] After preparing a second package for Hooker, Henslow wrote again nine days later (30 January 1836) that, 'The public will have far greater confidence in your remarks & descriptions than in any attempt of mine – Darwin's letters contain very little Botanical allusion, as he is no Botanist – His collections were made to please me–'.[29]

With Hooker's help, Henslow did publish two papers on Darwin's collections: 'Descriptions of two new species of *Opuntia;* with remarks on the structure of the fruit of *Rhipsalis.*'[30] on a few of Darwin's cacti, and 'Flora Keelingensis. An account of the native plants of the Keeling Islands.'[31] Of the latter, Henslow wrote to Hooker on 9 March 1838: 'I have now sent you merely the *rough draft* which you will be so good as to return for me to correct & *condense* - . . . Be so good as to let me have what you can *speedily* as I have only 6 weeks before lectures begin, & if I do not get my M.S. in time I must again lay it aside till they are over -'.[32] As we shall see, the tone of this letter is very much like those that Darwin was writing to Henslow at this time.

Upon returning to England, Darwin sent Henslow his Galápagos Islands plants, which with the Keeling Islands specimens appear to be almost the only botanical collections made after leaving Peru. His failure to do any more plant collecting than this may have been due to the limited space for specimen storage on the *Beagle* being almost filled up by his Galápagos gatherings,[33] but more likely was due to the areas next visited (Tahiti, New Zealand, Australia, Tasmania, Mauritius, Cape of Good Hope) already being well-collected.

As we have seen, Darwin paid particular attention to the collecting of his Galápagos plants, and he was especially interested in their identification. In conjunction with his request to the Government for a grant to publish the *Zoology of the Beagle,* Darwin wrote to Henslow on 18 May 1837: 'I forgot to ask you: if I succeed with government & *if* afterwards it appears advisable, should you object to publish the botany of the Galápagos in it, as a part of the fauna? – I certainly should like, if possible, some part of the botany kept together when there are materials for any general results.'[34]

At this time, Darwin was writing up his journal for publication, and he needed a number of botanical questions answered. In every letter written to Henslow from May 1837 until a few days before the manuscript was sent to press in August, Darwin queried Henslow on his plants. In May he wrote: 'There are about half a dozen plants, of which if I do not know the names of genus or something about them, I must strike out long passages in my journal.'[35] His last letter in August implored: 'I send my MSS to the press the day after tomorrow . . . Pray write *soon* & tell me whether you can answer me any of the questions, so that I may know. – I should want first the two or three about *America.*'[36] Apparently the questions went unanswered. The first edition of the *Journal of Researches*[37] is singularly sparse in botanical information, although Henslow did read the proofs for Darwin.[38]

Darwin's *Autobiography*[39] indicates that his interest in the variation of Galápagos species included *both* plants and animals, not just the tortoises and finches which are the usual examples given. This may be the primary reason that Darwin kept pumping Henslow for information on his Galápagos plants.

In spite of his apparently minimal assistance to Darwin in identifying the collections, Henslow should not be judged too harshly. This was a very busy period for him. Besides being Professor of Botany, Henslow also was Director of the University Botanic Garden; planning for the new garden, which opened in 1846, probably took more time than his professorial duties. In addition, he was curating the Herbarium, planning museums in Ipswich and Cambridge, and pursuing his own research on the British flora and fossil plants.

In 1837 Henslow was presented with 'the valuable but exacting living of Hitcham in Suffolk'.[40] In 1839 he gave up his residence in Cambridge and moved to Hitcham. He wrote to Sir William Hooker, who had been knighted in 1836, (17 December 1839): '. . . & now reside here continuously excepting for the month in spring when I have to deliver my lectures – I am not 40 miles from Cambridge & have ready communication enough, but miss the public library, & can have only a part of my Herbarium about me - However, I am in a very retired spot & have much more leisure for my pursuit of Botany, notwithstanding my parish avocations, which I no way neglect, than I had in Cambridge.'[41]

However much time he had for botany in the beginning of his stay in Hitcham, it soon vanished. Henslow applied himself conscientiously to his pastoral duties and did less academic botany. He never applied himself more than superficially to Darwin's plants, many of which remain unidentified to this day. Henslow performed admirable service in getting Darwin onto the *Beagle* and in receiving his collections as they dribbled back from across the world, but he failed in his good-hearted attempts to work up the plants.

If the issue had ended here, almost all of Darwin's collections still might remain unidentified. However, Dr Joseph Dalton Hooker (1817–1911) now entered the scene. J. D. Hooker was the son of Sir William Hooker, and he later became Henslow's son-in-law. Hooker met Darwin briefly in London on two occasions in 1839.[42]

On 30 September 1839, Hooker left England on his own voyage, accompanying Captain Sir James Clark Ross (1800–1862) as botanist and assistant surgeon with HMS *Erebus* and *Terror* to the Antarctic. Hooker's voyage in many ways parallels that of Darwin's on the *Beagle.* Darwin, in fact, served as an inspiration to him: his enthusiasm was fueled by reading proof-sheets of Darwin's *Journal of Researches,* sent to him by his father just prior to his departure. He returned to England on 4 September 1843, fired with enthusiasm to publish a *Flora Antarctica,*[43] which his father had urged him to do.

Even before Hooker returned, on 12 March 1843 Darwin wrote to Sir William, now Director of the Royal Botanic Gardens, Kew: 'I am very glad to hear you talk of inducing your son to publish an Antarctic Flora. I have long felt much curiosity for some discussion on the general character of the flora of Tierra del Fuego, that part of the globe farthest removed in latitude from us. How interesting will be a strict comparison between the plants of these regions & of Scotland or Shetland. I am sure I may speak on the part of Prof. Henslow that all my collection (which gives a fair representation of the Alpine flora of Tierra del Fuego & of Southern Patagonia) will be joyfully laid at his disposal.'[44]

In his first letter to J. D. Hooker (21 November 1843), Darwin wrote:[45]

> But I have run from the subject, which made me write, of expressing my pleasure that Henslow (as he informed me a few days since by letter) has sent to you my small collection of plants. You cannot think how much pleased I am, as I feared they would have been all lost, & few as they are they cost me a good deal of trouble. There are a very few notes, which I believe Henslow has got, describing the habitats &c. of some few of the more remarkable plants. I paid particular attention to the Alpine flowers of Tierra Del., & I am sure I got every plant which was in flower in Patagonia at the seasons, when we were there. . . . I hope Henslow will send you my Galapagos Plants (about which Humboldt even expressed to me considerable curiosity). I took much pains in collecting all I could. A Flora of this Archipelago would, I suspect, offer a nearly parallel case to that of St. Helena, which has so long excited interest.

Hooker answered (28 November 1843): 'Many thanks for your kind letter of congratulations & also for your offer of assistance in examining the plants you collected, of which I shall most thankfully avail myself. It is very liberal of you to place them so at my disposal & I do hope that I shall show myself not to be altogether unworthy of the trust. . . . Professor Henslow has kindly promised to send your Galapagos plants as well as the Antarctic, I am not aware of any collector having been there but yourself and Douglas.'[46] This was David Douglas (1798–1834), collector for the Horticultural Society, who visited the archipelago briefly in January 1825. Actually, Darwin was preceded not only by Douglas, but also by Dr John Scouler (1804–1871), who was ship's-surgeon and naturalist with Douglas; by James McRae (?–1830), another collector for the Horticultural Society, who followed Douglas and Scouler by two months; by Hugh Cuming (1791–1865), sailmaker and naturalist, who collected in the islands in 1829; and by Archibald Menzies (1754–1842), naturalist and surgeon with Captain George Vancouver (1758–1798) on HMS *Discovery*, who made the first known Galápagos plant collections in 1795.[47]

Henslow delivered Darwin's collections and notes to Hooker over a period of months, beginning in late 1843. On 21 November 1843, Henslow wrote Hooker: 'I shall be delighted to place Darwin's plants in your hands – & beg you will make just whatever use of them you please – not forgetting to give me a rap on the knuckles for having done so little with them – Some few I have named & incorporated with the herbarium, but I can give you the list of these – My duties here [Hitcham] quite debar me from pursuing Botany with any vigor now. . . . I have an interesting set of plants from the Galapagos from Darwin – & have been intending again & again to set to work at them – they are there – Would these be wanted by you?'[48]

Henslow seems continually to have been discovering plants that had been overlooked and not forwarded with the bulk of the collection. As late as 28 February 1846 he wrote to Hooker: 'I have stumbled upon a few of Darwin's ferns which have not been sent to you –'[49] On 1 July 1846 he wrote to Sir William: 'I have stumbled upon 2 or 3 more of Darwin's *S. W.* American plants, but I believe these must be the *last* I had overlooked in picking them out of the packets for Dr Jos.'[50] In November of that year (6 November 1846), however, he wrote again to Sir William: 'Tell Dr Jos. I will bring with me on the 19th (as far as London) the 2 bottles he alluded to – but one of them contains a Calceolaria which I suppose Darwin fancied was an orchid.'[51]

Besides the Darwin plants, Henslow also forwarded a Galápagos collection made by James McRae. He wrote to Hooker on 10 December 1843:[52]

> I shall leave at 13 Clements Green [his brother's house] the Galapagos plants, in my way thru Town tomorrow – You will find a few with them from *Macrae* which belong to the Horticultural Soc – I had begun by a few random notes to examine them before I left Cambridge, & have left them just as

> I inserted them at the time – Since I came here [Hitcham] I have had no time for them – always intending to recommence – but never being able to do so among my numerous engagements & duties – You will find an interesting set of plants – Pray publish them in any way you prefer. I am too happy to see justice done to Darwin's exertions to think of making stipulations of any sort – Do just as you please – giving him due credit for collecting in a branch of science which formed no part of his studies, & solely to oblige me.

In Hooker, Darwin had found someone unencumbered by too many other duties, someone who could devote more time than Henslow to his plant collections. Hooker began with the Falkland Island and Tierra del Fuego specimens, identifying them and citing them in his *Flora Antarctica*. True to form, Darwin immediately began peppering him with questions about his plants, many of them the same questions on distribution and relationships he had asked Henslow six years previously. This time, however, he received the answers. These answers were quite important for Darwin in writing the second edition of his *Journal of Researches*.[53] Although this edition is more concise than the first, the information on plants in it is much greater, particularly in the chapter on the Galápagos Islands, which Hooker read for him in proof. Hooker rapidly became Darwin's source for botanical knowledge, his confidant, his best friend.

Darwin and McRae's Galápagos specimens, along with those few of Douglas, Scouler, Cuming, and some others, served Hooker as the basis for two papers on the Galápagos flora. These were worked up from 1843 to 1846 and published in the *Transactions of the Linnean Society* in 1847. The first[54] was the initial attempt to produce a flora of these interesting islands. The second[55] was the first of many papers that Hooker was to devote to plant geography. They are both classics in their fields, the one because it is so important for the typification of many Galápagos endemics, the other because it was the first to hypothesize the various dispersal mechanisms by which the plant colonizers arrived in the islands and from whence they came.

A few of Darwin's other specimens served as types for new species described in various publications by Hooker, Sir William, and others. Nevertheless, the majority of his plant collections remain unidentified in the Cambridge University Herbarium, a situation I hope to rectify in the near future.

Because Hooker accomplished his work on the Galápagos plants mainly while he was at Kew, and because there is a partial set of these plants there, many taxonomists have assumed that the types of the many new species he described must be there as well. However, I have just completed a study on Darwin's Galápagos specimens and find that those at Kew are duplicates, the main set being at Cambridge.[56] A few of Darwin's *Beagle* specimens are to be found in other herbaria (i.e., the Gray Herbarium, Harvard University; the herbarium of the Missouri Botanical Garden; the Manchester Museum). These were sent to their curators by Hooker or the Kew botanist George Bentham (1800–1884), and are duplicates of specimens at Cambridge or Kew.

What happened to Darwin's "memoranda" on his plants[57] and Henslow's notes on the Galápagos specimens? In November 1845, Hooker wrote to Darwin implying that he was returning both specimens and notes to Henslow.[58] The whereabouts of the latter, however, is unknown. Perhaps Hooker discarded them, rather than returning them to Henslow, although this is unlikely. Henslow himself may have discarded or misplaced them. They are still being sought; hopefully, some day they will be discovered in the archives of Cambridge or Kew or at Down House. It may be that, rather than being a separate set of notes, Darwin's "memoranda" are the comments on plants that he made in his field notebooks.

With the publication of the two Galápagos papers by Hooker, work on the *Beagle* plant collections stopped.[59] Henslow was immersed in his parish work; Hooker early in 1846 took a position with the Geological Survey to study Britain's fossil flora, and in 1847 left to spend four years in India to collect the Himalayan flora and later to go on to other botanical interests. Both Henslow and Hooker continued to correspond with Darwin. Henslow's correspondence becomes less botanical and more general, however, while Hooker's retains much botanical discussion to the end.

Francis Darwin and A. C. Seward, writing in 1903, characterized Charles Darwin and Joseph Hooker's relationship thus:[60]

> The close intercourse that sprang up between them was largely carried on by correspondence, and Mr. Darwin's letters to Sir Joseph have supplied most valuable biographical material. But it should not be forgotten that, quite apart from this, science owes much to this memorable friendship, since without Hooker's aid Darwin's great work would hardly have been carried out on the botanical side. And Sir Joseph did far more than supply knowledge and guidance in technical matters: Darwin owed to him a sympathetic and inspiring comradeship which cheered and refreshed him to the end of his life.

By supplying answers to Darwin's botanical questions which Henslow could not (or would not) answer, Hooker started Darwin down the parth which culminated in the many botanical works he was to publish after 1859.

ACKNOWLEDGEMENTS

Research for this paper was made possibly by a grant from the Penrose Fund of the American Philosophical Society and travel funds from the Virginia Polytechnic Institute & State University Education Foundation. I am indebted to the directors and staffs of the Cambridge University Library, Cambridge University Herbarium, Royal Botanic Gardens, Kew, and Down House for the opportunity of examining their collections of Darwiniana, Kew allowing me to quote from unpublished letters; Peter Gautrey, Peter Sell, Miss E. Smith, Grenville Lucas, and Philip Titheradge have been especially helpful. I owe special thanks to Miss Mea Allan for sharing some unpublished correspondence between Henslow and the Hookers with me, which I quote with her permission. Indeed, all biologists are indebted to her for showing us[16] the influence of botany on Darwin. I am grateful to my wife Sarah and to my colleagues Professors Albert Moyer and David West for their comments on drafts of this paper, and to Dr Sydney Smith, St Catharine's College, Cambridge for sharing his profound knowledge of Darwin and for his continuing encouragement of my studies. None of this would have been possible without the assistance of Mrs Shirley Lucas, of which I am most grateful.

SOURCES

Except for Darwin's letters to William Darwin Fox (note 21) and Sir William Hooker (note 44), I have seen the originals or facsimiles of all cited correspondence. However, if a given letter has been published, as most have, a reference to the place of publication is given. The provenance of the letters is as follows: Darwin to Henslow(Original Letters, from Chas. Darwin, to Professor Henslow. 1831–1837. Royal Botanic Gardens, Kew), Darwin to J. D. Hooker (Darwin Papers, Vol 114. Cambridge University Library), Henslow to Darwin (Original Letters. . . . Kew; Darwin Papers, Vol. 97. CUL), Henslow to J. D. Hooker (English Letters. . . .Kew; R. A. Hooker Letters, photocopies held by Miss Mea Allan), Henslow to W. J. Hooker (English Letters. . . . Kew; R. A. Hooker Letters), and J. D. Hooker to Darwin (Darwin Papers, Vol. 100. CUL). Original punctuation and spelling have been retained in all cases.

NOTES AND REFERENCES

1 BARLOW, N. (ed.), 1958. *The autobiography of Charles Darwin, 1809–1882.* Harcourt, Brace, & World, New York. p. 60.

2 In later life, Darwin played down the role of Cambridge in his education; in fact he stood tenth in his class.

3 The quotations are from BARLOW, *Autobiography* pp. 60, 52.

4 He did so many times in correspondence, and once in print (DARWIN, C., 1855. Does sea-water kill seeds? *Gard. Chron.* no. 21, 26 May, p. 356). The leading botanist of the time in the United States, Asa Gray (1810–1888), also called him a geologist (GRAY, A., 1876. *Darwiniana: essays and reviews pertaining to Darwinism.* Appleton, New York; reprint ed. by DUPREE, A. H., 1963. Belknap Press of Harvard University Press, Cambridge, Massachusetts. p. 132). In spite of his many botanical papers and books, Darwin continually referred to himself as a "Botanical Ignoramus" (e.g. in a letter of 21 November 1843 to J. D. Hooker, printed in DARWIN, F. (ed.), 1888. *The life and letters of Charles Darwin.* Appleton, New York. 2 vols. 1: 382). However, it must be remembered that this was mainly to persons like Gray and Hooker, the leading botanists of the day.

5 GRUBER, H. E. and GRUBER, V., 1962. The eye of reason: Darwin's development during the *Beagle* voyage. *Isis* **53**: 186–200.

6 LYELL, C., 1830–1832. *Principles of geology.* vols. 1 and 2. John Murray, London.

7 BARLOW, N. (ed.), 1967. *Darwin and Henslow, the growth of an idea. Letters 1831–1860.* Bentham-Moxon Trust and John Murray, London. Letter 19: 51.

8 BARLOW, *Autobiography.* pp. 77ff.

9 BARLOW, N. (ed.), 1946. *Charles Darwin and the voyage of the Beagle.* Philosophical Library, New York. p. 150. Herein are printed a number of mainly zoological extracts from the notebooks.

10 BARLOW, *op. cit.*, indicates that there are 24 notebooks, but this is incorrect.

11 BARLOW, *op. cit.*

12 DARWIN, C. (ed.), 1839–1843. *Zoology of the voyage of H.M.S. Beagle.* 5 vols. Smith Elder, London.

13 DARWIN, C. 1842. *The structure and distribution of coral reefs.* 1844. *Geological observations on the volcanic islands.* 1846. *Geological observations on South America.* Smith Elder, London.

14 BARLOW, N. (ed.), 1963. Darwin's ornithological notes. *Bull. Brit. Mus. (Nat. Hist.) hist. Ser.* **2** (7): 201–278.

15 BARLOW, *Darwin and Henslow.* Letter 20: 58.

16 BARLOW, *op. cit.* Letter 22: 66. ALLAN, M. 1977. *Darwin and his flowers: The key to natural selection.* Taplinger, New York. pp. 84–85,

17 BARLOW, *op. cit.* Letter 20: 58.

18 BARLOW, *op. cit.* Letter 22: 66. ALLAN, *op. cit.*: 84.

19 BARLOW, *op. cit.* Letter 28: 78. ALLAN, *op. cit.*: 85.

20 BARLOW, *op. cit.* Letter 31: 84. ALLAN, *loc. cit.*

21 DARWIN, *Life and Letters.* **1**: 234.

22 BARLOW, *Darwin and Henslow.* Letter 41: 113.

23 BARLOW, *op. cit.* Letter 13: 43.

24 BARLOW, *op. cit.* Letter 17: 50.

25 BARLOW, *op. cit.* Letter 26: 71.

26 In *Hook. J. Bot.* **3**: 333. Darwin specimens continue to be used to typify new names, the latest being *Spilanthes darwinii* D. M. Porter, *Madroño* **25**: 58, 1978, from the Galápagos Islands.

27 *English Letters/1832–35/H–L/Vol. V,* Royal Botanic Gardens, Kew. Letter 117. His 'little vol. in Lardner' was *Principles of descriptive and physiological botany* in Lardner's *Cabinet Cyclopedia* London, 1836.

28 *English Letters/1835–36/H–W/Vol. VIII,* Royal Botanic Gardens, Kew. Letter 5.

29 *Op. cit.* Letter 6.

30 HENSLOW, J. S., 1837. *Mag. Zool. Bot.* **1**: 466–469.

[31] HENSLOW, J. S., 1838. *Ann. Nat. Hist.* **1**: 337–347.

[32] *English Letters/H–Z/1838/Vol. XI,* Royal Botanic Gardens, Kew. Letter 7.

[33] The small amount of space available to Darwin on the *Beagle* is discussed by SMITH, S., 1960. The origin of 'The Origin.' *Adv. Sci.* **64**: 396.

[34] BARLOW, *Darwin and Henslow.* Letter 47: 129.

[35] BARLOW, *op. cit.* Letter 47: 128.

[36] BARLOW, *op. cit.* Letter 50: 133. The word which I have deciphered from Darwin's handwriting as 'want', Barlow gives as 'count'.

[37] DARWIN, C., 1839. *Narrative of the surveying voyages of His Majesty's ships* Adventure *and* Beagle, *between the years 1826 and 1836, describing their examination of the southern shores of South America, and the* Beagle's *circumnavigation of the globe. Vol. 3. Journal and remarks. 1832–1836.* Henry Colburn, London.

[38] BARLOW, *Darwin and Henslow:* 14.

[39] BARLOW, *Autobiography:* 80.

[40] BARLOW, *Darwin and Henslow:* 16.

[41] *English Letters/H–Z/1839/Vol. XIII,* Royal Botanic Gardens, Kew. Letter 7.

[42] The first meeting was in the company of Asa Gray at the Hunterian Museum, Royal College of Surgeons (DUPREE, A. H., 1959. *Asa Gray, 1910–1888.* Belknap Press of Harvard University Press, Cambridge, Massachusetts. p. 81), in January, a meeting that Hooker apparently forgot. In later life, he wrote to Darwin's son Francis that, 'My first meeting with Mr. Darwin was in 1839, in Trafalgar Square. I was walking with an officer who had been his shipmate for a short time in the *Beagle* seven years before, but who had not, I believe, since met him.' (DARWIN, *Life and Letters,* 1: 380). Because of Hooker's statement, this meeting invariably is cited in the literature as their first. Sidney Smith has pointed out to me that the unidentified officer can be none other than Robert McCormick (1800–1890), surgeon on the *Beagle* who returned to England early in the voyage because of differences with Captain Fitz-Roy and other of the officers. He was soon to be surgeon, and nominally Hooker's superior, on the *Erebus* and *Terror* voyage.

[43] HOOKER, J. D., 1844–1847. *The botany of the Antarctic voyage of H. M. discovery ships* Erebus *and* Terror *in the years 1839–1843, under the command of Captain Sir James Clark Ross. Part I. Flora Antarctica.* 2 vols. London.

[44] DARWIN, F. and SEWARD, A. C. (eds.), 1903. *More letters of Charles Darwin.* Appleton, New York. 2 vols. **2**: 242–243, Letter 575.

[45] DARWIN, *Life and Letters,* **1**: 382–383; much in ALLAN, *Darwin and his flowers:* 134–135. On 18 September 1839, referring to Darwin's *Journal of Researches,* the great German scientist Alexander von Humboldt (1769–1859) had written to him: 'How much I regret that Mr. Henslow could not finish the examination of your curious collection (pp. 460, 537, 541), or at least the keying of the families containing some known species.' BARRETT, P. H. and CORCAS, A. F., 1972. A letter from Alexander Humboldt to Charles Darwin. *Jour. Hist. Med.* **27**: 169.

[46] ALLEN, *op. cit.*, p. 135.

[47] The early history of botanical collecting in the Galápagos Islands is discussed in PORTER, D. M. (in press). The vascular plants of Joseph Dalton Hooker's "An Enumeration of the plants of the Galápagos Archipelago; with descriptions of those which are new." *Botanical Journal of the Linnean Society.*

[48] *R. A. Hooker Letters.* Letter 1.

[49] *R. A. Hooker Letters.* Letter 9.

[50] *English Letters/1846/Vol. XXIV,* Royal Botanic Gardens, Kew. Letter 258.

[51] *Op. cit.* Letter 265.

[52] *R. A. Hooker Letters.* Letter 2.

[53] DARWIN, C., 1845. *Journal of researches into the Natural history and geology of the countries visited during the voyage of H. M. S.* Beagle *round the world, under the command of Capt. Fitz-Roy, R. N.* ed. 2. John Murray, London.

[54] HOOKER, J. D., 1847. An enumeration of the plants of the Galapagos Archipelago; with descriptions of those which are new. *Trans. Linn. Soc. Bot.* **20**: 163–233.

55 HOOKER, J. D., 1847. On the vegetation of the Galapagos Archipelago, as compared with that of some other tropical islands and of the continent of America. *op. cit.* **20**: 235–262.

56 Problems of typification with Hooker's Galapagos plant names are taken up in PORTER, *op. cit.*

57 'I have Darwin's *memoranda* to bring up with me – & if I can I will bring also the Galapagos plants.' Henslow to J. D. Hooker, 9 September 1843. *English Letters/A–H/1843/Vol. XIX,* Royal Botanic Gardens, Kew. Letter 326.

58 'I have often tried to make your notes [illegible word] on to the species. I wish you would come & take a look at them before I return them to Henslowe.' *Darwin Papers,* Vol. 100, Cambridge University Library. Letter 15.

59 The fungi were published upon by the Reverend Miles Joseph Berkeley (1803–1889): BERKELEY, M. J. 1839. Notice of some fungi collected by C. Darwin, Esq., during the expedition of H. M. Ship *Beagle. Ann. nat. Hist.* **4**: 291–293. 1842. Notice of some fungi collected by C. Darwin, Esq., in South American and the Islands of the Pacific. *Ann. Mag. nat. Hist.* **9**: 443–448. 1845. On an edible fungus from Tierra del Fuego, and an allied Chilean species. *Trans. Linn. Soc.* **19**: 37–43.

60 DARWIN and SEWARD, *More Letters.* **1**: 38–39.