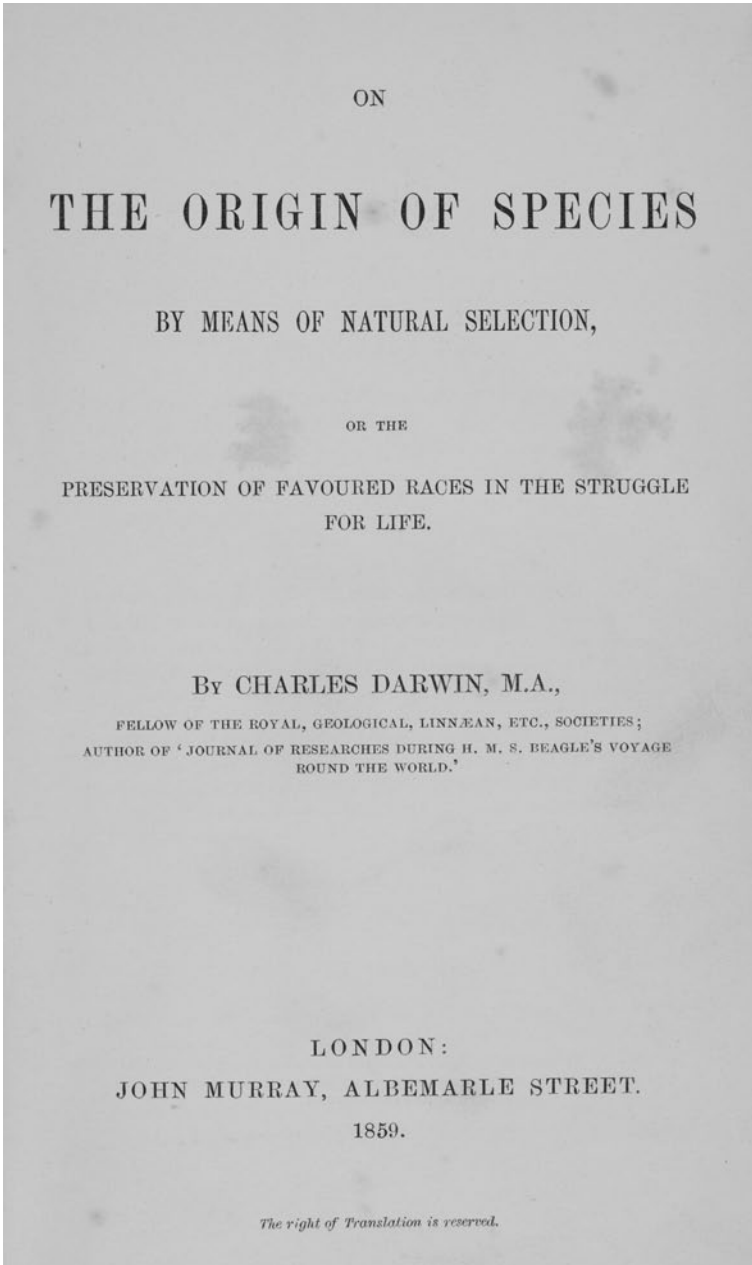


## ON THE ORIGIN OF SPECIES

Charles Darwin's *On the Origin of Species By Means of Natural Selection* is both a key scientific work of research, still read by scientists, and a readable narrative that has had a cultural impact unmatched by any other scientific text. First published in 1859, it has continued to sell, to be reviewed and discussed, attacked and defended. The *Origin* is one of those books whose controversial reputation ensures that many who have never read it nevertheless have an opinion about it. Jim Endersby's major new scholarly edition debunks some of the myths that surround Darwin's book, while providing a detailed examination of the contexts within which it was originally written, published and read. Endersby provides a new, up-to-date and very readable introduction to this classic text and a level of scholarly apparatus (explanatory notes, bibliography and appendixes) that is unmatched by any other edition.

JIM ENDERSBY is Lecturer in British History at the University of Sussex.



Cambridge University Press  
978-1-316-61020-6 - On the Origin of Species  
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ON THE  
ORIGIN OF SPECIES

...

CHARLES DARWIN

EDITED BY

JIM ENDERSBY

UNIVERSITY OF SUSSEX



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University Printing House, Cambridge CB2 8BS, United Kingdom

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[www.cambridge.org](http://www.cambridge.org)

Information on this title: [www.cambridge.org/9781316610206](http://www.cambridge.org/9781316610206)

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First published 2009

First paperback edition 2015

*A catalogue record for this publication is available from the British Library*

*Library of Congress Cataloguing in Publication data*

Darwin, Charles, 1809–1882.

On the origin of species / Charles Darwin ; edited by Jim Endersby.  
 p. cm.

Includes bibliographical references and index

ISBN 978-0-521-86709-2 Hardback

ISBN 978-1-316-61020-6 Paperback

1. Evolution (Biology)      2. Natural selection    I. Endersby, Jim.      II. Title  
 QH365.O2 2009B  
 576.8'2-dc22 2009005861

ISBN 978-1-316-61020-6 Paperback

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## CONTENTS

...

*List of illustrations* [page vi]

*Acknowledgements* [viii]

*Editor's introduction* [ix]

## ON THE ORIGIN OF SPECIES [1]

*Appendix 1: An evolving Origin* [377]

*Appendix 2: Biographical register* [396]

*Explanatory notes* [415]

*Bibliography* [422]

*List of works cited* [423]

*Index* [435]

## ILLUSTRATIONS

. . .

- |   |   |                |
|---|---|----------------|
| 1 | Victorian steam-powered printing press.<br>(From Luke Herbert, <i>The Engineer's and Mechanic's Encyclopaedia</i> , London, 1849. Courtesy of the Syndics of the Cambridge University Library.)   | <i>page</i> xv |
| 2 | Title and frontispiece from G.H. Lewes, <i>Sea-Side Studies</i> , Edinburgh, 1858. (Courtesy of the Syndics of the Cambridge University Library.)   | xvi            |
| 3 | ‘Nice day for a row’: <i>Punch</i> ’s jaundiced view of the delights of the English seaside. (Courtesy of the Syndics of the Cambridge University Library.)   | xviii          |
| 4 | Darwin’s microscope, which he used when dissecting barnacles. (Courtesy of the Whipple Museum of the History of Science, Cambridge University.)   | xx             |
| 5 | Title and frontispiece from Charles Kingsley’s <i>Glaucus; or, The Wonders of the Shore</i> (1855). (Courtesy of the Syndics of the Cambridge University Library.)  | xxi            |
| 6 | Plate vi from Darwin’s <i>Monograph on the Subclass Cirripedia</i> (vol. 1, 1851): in figure 1b the hollow marked ‘the part labelled “b”’ is ‘depression for the reception of the male’. (Courtesy of the Syndics of the Cambridge University Library.) | xxxiii         |
| 7 | Annual pigeon show of the Philoperisteron Society, from the <i>Illustrated London News</i> . (Courtesy of James A. Secord.)   | xxxv           |
| 8 | Victorian fancy pigeon breeds. (Courtesy of James A. Secord.)   | xxxvii         |

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Frontmatter  
[More information](#)

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<i>List of illustrations</i>		vii
9	Frontispiece of Charles Lyell, <i>The Principles of Geology</i> (1830–3). (Courtesy of the Syndics of the Cambridge University Library.)	xlvii
10	The parts of a watch. Diagram from William Paley, <i>Natural Theology</i> , ‘Illustrated by a series of plates, and explanatory notes, by James Paxton’ (Oxford, 1826). (Courtesy of the Syndics of the Cambridge University Library.)	liv
	<i>Diagram 1</i> Darwin’s diagram of divergence.	98

## ACKNOWLEDGEMENTS

...

My interest in Darwin began when I read the essays of the late Stephen Jay Gould, which persuaded me to read the *Origin* for myself, and I'm very glad I did. My fascination with all things Darwinian was then cemented by David Oldroyd, whose undergraduate course on the Darwinian Revolution was an inspiration. I am also grateful to Gillian Beer, Janet Browne, David Kohn and Martin Rudwick, whose books and conversation have continued to shape and deepen my interest in nineteenth-century science.

Particular thanks to Thomas Dixon, Anne Secord, Jim Secord, Jenny Bourne Taylor, Pam Thurschwell and Paul White, all of whom read and commented on the introduction for me, much improving it in the process.

Thanks also to Linda Bree, Stewart Brown, Derek Caudwell, Simon Chaplin, Gina Douglas, Signe Gossmann, Ben Jones, Dawn Moutrey, Leslie Overstreet, Emily Pawley, Charlotte M. Porter, Harriet Ritvo, Jonathan Smith, Lesley Whitelaw and David Whitesell. Also to John van Wyhe (Complete works of Charles Darwin online, [www.darwin-online.org.uk/](http://www.darwin-online.org.uk/)) and to Alison Pearn and the staff of the Darwin Correspondence Project ([www.darwinproject.ac.uk/](http://www.darwinproject.ac.uk/)).

My thinking on Darwin (as on everything else) is deeply indebted to the work of Jim Secord; any merits this edition possesses are largely the product of his inspiring teaching and scholarship. Its faults are, of course, entirely my own.



## EDITOR'S INTRODUCTION

...

Charles Darwin's book *On the Origin of Species by Means of Natural Selection* was first published in 1859, since when it has continued to sell and to be reviewed and discussed, attacked and defended. Unlike most scientific works of the past, the *Origin* is still read by working scientists; it is often described as the founding document of modern evolutionary theory, although it is missing several large pieces of that theory and instead contains much that modern biologists reject. Others regard it as a manifesto for atheism, because it denies that humans were created by God, although it says almost nothing about humans or God – and what it does say is ambiguous. In places the book is dense with facts about everything from geology to embryology, from bumble bees to pigeon-breeding, while elsewhere it is as readable as a novel. It is one of those books whose controversial reputation ensures that many who have never read it nevertheless have an opinion about it.

So, one hundred and fifty years after it first appeared, how might *On the Origin of Species* be read? It is routinely described as a timeless classic, 'one of those works that fundamentally and permanently alter our vision of the world'.<sup>1</sup> It 'ushered in a new era in our thinking about the nature of man', thus having an impact that was 'greater than those caused by the works of Copernicus, Newton, and the great physicists of more recent times'.<sup>2</sup> Indeed, 'the Darwinian revolution is the only biological revolution to be mentioned in the usual list of great revolutions in science, which are usually associated with the names of physical scientists'.<sup>3</sup> The *Origin* is 'surely one of the greatest scientific books ever written'.<sup>4</sup> It has also become a classic of Victorian literature, a book that is 'one of the most extraordinary examples of a work which included more than the maker of it at the time knew'.<sup>5</sup>

<sup>1</sup> Carroll 2003: 9.    <sup>2</sup> Mayr 1859 (1964): vii.    <sup>3</sup> Cohen 1985: 283.

<sup>4</sup> Browne 2006: 1.    <sup>5</sup> Beer 2000: 2.

Without disputing any of these statements, I want to try and forget the *Origin's* current status for a moment and instead try to understand how its Victorian readers might have approached it, particularly in the English-speaking world where it had its initial impact.<sup>6</sup> Even if it is ultimately impossible fully to reinhabit the minds of those first readers, the effort is worth making, because rediscovering the original context of the book illuminates not just Darwin and his achievements but also the nature of the Victorian scientific endeavour and the society that shaped it.

If you ask most people why Darwin is famous, you will be told something along the lines that he 'discovered the theory of evolution', which implies a commonsense view that scientific truths are, in some fairly unproblematic sense, simply 'out there', waiting to be found. Common sense is, arguably, mistaken on this point, but even if we assume for a moment that it's correct, that still leaves us with the question of why specific discoveries are made in particular times and places, the question of why *Darwin* was the one who actually made the breakthrough. Perhaps because he was a genius – a word that is often used to describe him – but if devising the theory of evolution by natural selection was merely a matter of raw intellectual horsepower, why didn't Aristotle come up with it? He was after all, at least as brilliant as Darwin and every bit as interested in understanding living things. Darwin needed no complex scientific equipment or elaborate experiments to do his work, just keen eyes, a sharp mind and patience (rare qualities, admittedly, but not unique). The point may be clearer if we take an example a little closer to Charles Darwin's time: why didn't his grandfather, Erasmus Darwin, devise the theory? By comparison with his grandson, Erasmus is not a well-known figure, but he was also brilliant, well educated and widely read, fascinated by the sciences and by natural history in particular. And he was an evolutionist, who argued that all living things had been derived by natural laws from earlier forms. So, why was Darwinism the creation of Charles and not Erasmus? Histories of evolutionary thought tend to argue that Charles,

<sup>6</sup> Studies of the book's reception include: Hull 1973; Kelly 1981; Glick 1988; Montgomery 1988; Todes 1989; Vucinich 1989; Ellegård 1990; Killingley 1995; Numbers 1998; De Rooy 1998; Glick *et al.* 2001; Numbers and Stenhouse 2001.

unlike his grandfather, discovered a plausible, scientific mechanism – natural selection – through which evolution occurred, and that ensured its rapid acceptance by the scientific community. Again, there are reasons to doubt this explanation, but even if we accept it, it provides no answer to the question how and why Charles Darwin arrived at the mechanism.

Answering that question requires putting aside the question of individual discovery, and focusing instead on the ways in which Britain changed in the sixty-five years that separated Erasmus Darwin's key evolutionary work, *Zoonomia* (1794), from his grandson's. It is those changes, rather than the books' authors, that prove to be crucial to explaining both the *Origin's* appearance and impact. During that period, Britain became the world's most industrialised and urbanised country, and governed the largest empire ever seen. As a result of these upheavals, Charles had access to resources that his grandfather lacked. They included affordable, mass-produced scientific equipment, from microscopes to greenhouses and aquariums; more and cheaper books, magazines and journals on natural history than ever before; and lower costs and better services for sending letters, parcels and people around the country and the world. Charles Darwin himself was wealthy, wealthier than his grandfather, and so could have afforded whatever he needed; but the social, economic and technological changes that transformed Britain ensured that thousands of other naturalists around the world had access to the same resources. In the nineteenth century natural history became a massively popular pastime whose myriad practitioners provided Charles Darwin with a vast network of correspondents who could provide him with information, specimens and an audience.

Moreover, the nature of the changes that had transformed Britain's cities, economy and landscape also provided Charles Darwin with crucial intellectual resources, tools with which to think about the process of history and the nature of change. Victorian capitalism's triumphant ability to improve living conditions persuaded many Britons, including Darwin, that competition was an inevitable and beneficial aspect of society: companies and nations competed by producing products that were better, cheaper or more useful than those of their competitors; consumers selected from the available goods, and those manufacturers

who failed to find buyers were forced to improve their wares or perish. The weak – individuals, businesses and whole races – might perish, but those who survived and prospered could take comfort from the fact that they deserved their success. As we shall see, Darwin saw the same processes at work in nature: competition improved beetles and barnacles in exactly the way as it improved blast furnaces and butter-knives. Industrialisation and imperialism created many of the conditions that made Darwin's researches possible, from mass-produced microscopes to colonial civil servants with an interest in pigeons. They allowed him to develop a truly global view of the diversity of life, but they also provided something even more fundamental, the central metaphor of his theory.<sup>7</sup>

## Making the *Origin*

### I A COMMON PASSION

In the mid-1820s, two men could often be seen walking together along the cold beaches of the Firth of Forth, near Edinburgh. Their eyes were usually fixed on the ground at their feet, and they often stooped to pick up seaweeds or examine the contents of rock pools. The older man was Robert Edmond Grant, then in his early thirties and a lecturer on zoology at the city's university. His companion was Charles Darwin, still in his late teens and supposedly a medical student who was intended, like his older brother, to follow their father and grandfather into a medical career. It was not to be. Charles hated his medical studies and was especially horrified by the sight of operations; many decades later, when he came to write his autobiography, he recalled 'two very bad operations, one on a child', which 'fairly haunted me for many a long year'.<sup>8</sup>

The beach was a welcome alternative to university study and would eventually provide an escape from the medical career his father planned. Like so many of his contemporaries, what Darwin really loved was natural history – collecting, identifying and naming birds, beasts and flowers of every kind. At Edinburgh, he was particularly

<sup>7</sup> Sandow 1938; Young 1985a; Young 1985b; Radick 2003.    <sup>8</sup> Barlow 1958: 47–8.

fascinated by marine life, from common creatures in rock pools to those he obtained from the Newhaven fishermen he befriended. He collected everything enthusiastically and later recalled dissecting them ('as well as I could' given his 'wretched microscope') and doing his best to identify and name them. His diary records that on 15 February 1826 he 'caught an orange coloured globular (Zoophyte?)' that he found fixed to a rock. He kept it in a basin of water and found that when touched it would turn itself inside out 'much in the same way as a Glove is turned inside out'.<sup>9</sup>

Zoophytes (animal–plants or plant–animals) were a particular interest of Grant's (indeed, he coined the term 'zoophyte' to describe them). These simple sea creatures apparently blurred the boundaries – between animal and plant, and between simple and complex – and so seemed to provide an example of complexity emerging from simplicity, perhaps of the route by which plants and animals had derived from a common ancestor. Grant was a firm believer in the idea of transmutation (evolution), the claim that all living things were descended from earlier, simpler forms and that natural processes had gradually changed them into more complex forms.<sup>10</sup> His views were influenced by those of the French naturalist Jean-Baptiste Pierre Antoine de Monet, Chevalier de Lamarck (simply known as Lamarck), who argued that species, like everything else in nature, were subject to change and development and had not all been created at the same time.<sup>11</sup> Erasmus Darwin, whose ideas were in many respects similar to Lamarck's, had also been fascinated by these ambiguous sea creatures, as Charles would have discovered when he read his grandfather's book *Zoonomia* while at Edinburgh.<sup>12</sup>

Marine creatures were to remain one of Darwin's lifelong fascinations and he collected many kinds during his five-year voyage around the world aboard HMS *Beagle*. However, the seaside was to change dramatically in the decades between Darwin's student days and the

<sup>9</sup> C. Darwin, diary, 1826 (CUL-DAR129). Available online at [darwin-online.org.uk/content/record?itemID=CUL-DAR129](http://darwin-online.org.uk/content/record?itemID=CUL-DAR129).

<sup>10</sup> Desmond and Parker 2006.

<sup>11</sup> For more on Lamarck, see Jordanova 1984; [www.lamarck.cnrs.fr](http://www.lamarck.cnrs.fr).

<sup>12</sup> Barlow 1958: 49.

publication of the *Origin*. In the 1820s, beachcombing naturalists were a rarity – Darwin and Grant doubtless attracted the occasional stare from passers-by – but by the middle of the century, Britain's beaches were crawling with them. They had become common enough for the comic weekly *Punch* to caricature them regularly. They had been brought to the coast by the railways, which transformed British natural history along with almost everything else about the country. The growing fashion for seaside natural history illustrates some of the key changes that made the writing of the *Origin* possible.

In 1830, Britain had less than 100 miles of railway; by 1852 there were 6,600 miles, and the network tripled in size by the end of the century. The railways had been constructed by more than 200 competing companies, and the backbone of the network – 2,200 miles of it – had appeared in the first half of the 1840s, in little more than five years. The energy and determination of the railway builders inspired, and occasionally alarmed, their countrymen.<sup>13</sup> By the middle of the century, cheap fares had brought the seaside within everyone's reach and it rapidly became one of the most popular sites for holiday-makers.<sup>14</sup> Railway travellers needed something to read on their journeys, and their needs were met by steam-powered printing presses which, along with other innovations such as cheap machine-made paper, transformed the economics of publishing in the early decades of the nineteenth century (Figure 1).<sup>15</sup> As growing numbers of mass-produced books and periodicals were published, their prices fell rapidly. Readers multiplied almost as quickly, not least because of various initiatives to spread literacy, from evangelical crusades to increase Bible-reading to initiatives aimed at producing a workforce who were educated enough to cope with the constantly changing world of the factories. Audiences not only grew, they diversified, as publishers produced a wider range of products in their competition for readers; the presses churned out everything from penny weeklies to lavish illustrated volumes in an attempt to tailor their products to the diverse incomes and education of their potential purchasers.

Natural history enthusiasts were an obvious market for print, and by the middle of the century the market was almost glutted with books and

<sup>13</sup> Freeman 1999: 1–4. <sup>14</sup> Walton 1983. <sup>15</sup> Schivelbusch 1986: 57–72.

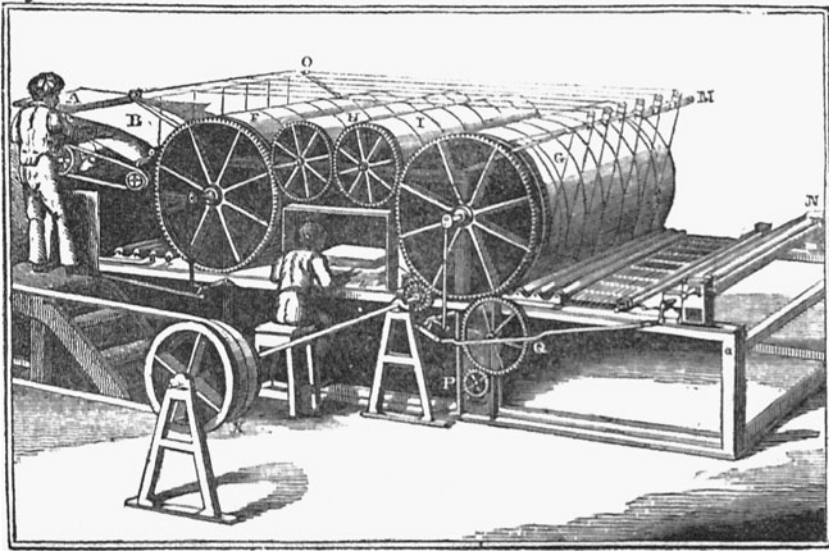


Figure 1. Victorian steam-powered printing press.

magazines that told their readers how, why and what to collect: from beetles to birds' eggs, from ferns to fossils, spiders to sea-shells. There were books for children, books that extolled the wisdom and goodness of the Creator, books that described the economic value of plants or trained ladies in how to paint and draw flowers; homilies and alphabets, primers and familiar introductions, pocket companions, expert classifications, atlases and massive scholarly volumes with expensive, hand-coloured plates. The imagination of publishers and the public's demand fed happily off each other.

By the 1850s, any railway traveller heading off for the coast who stopped at a bookshop (perhaps at one of Messrs W.H. Smith's new railway station bookstands) would find many volumes that celebrated the delights of seaside natural history. They might, for example, pick up George Henry Lewes's *Sea-Side Studies* (1858, Figure 2), from which they would discover that the main problem confronting seaside visitors was boredom. As a result,

at the coast we are all dismal as well as disagreeable. What an air of weariness hangs over almost everybody! After the 'visitors' have had

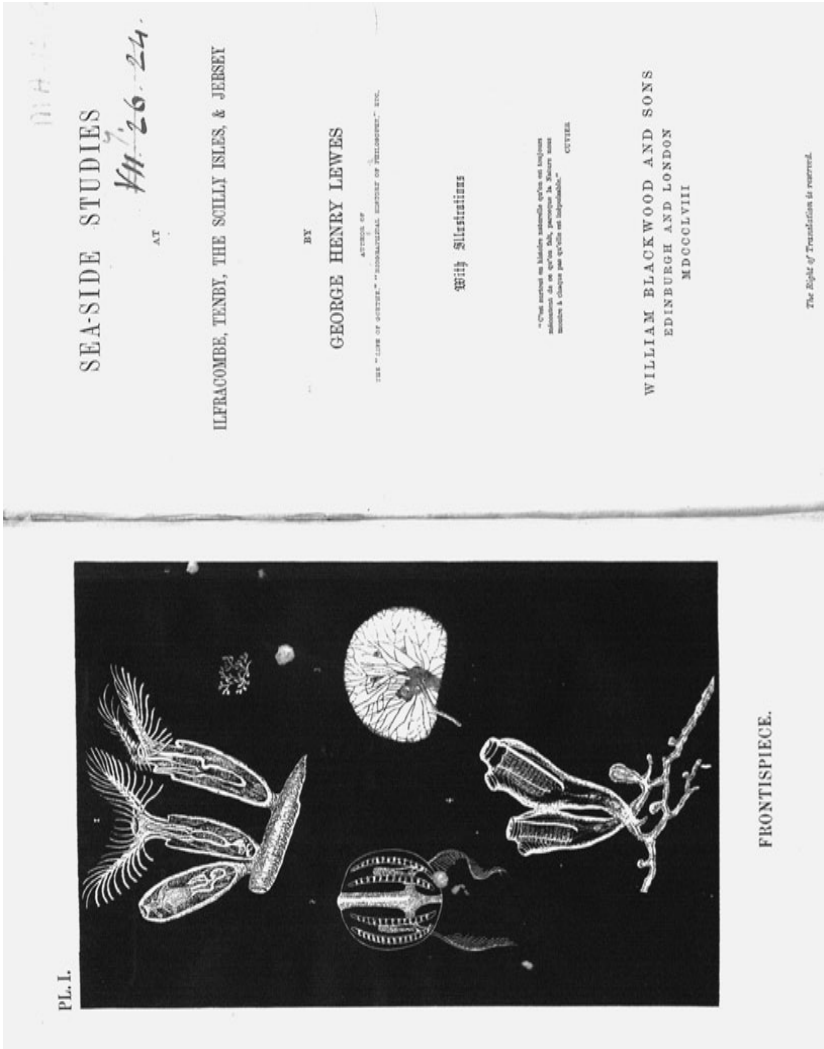


Figure 2. Title and frontispiece from G. H. Lewes, *Sea-Side Studies*, Edinburgh, 1858.



their first walk on the beach, their first two or three hours' 'sail', from which they return looking very green – after they have seen the sunset once, they relapse into utter novel-reading (Figure 3).

It was partly in an attempt to alleviate this weariness that Lewes offered a reader 'plain directions, by means of which he may study and enjoy the marvels of ocean life'.<sup>16</sup> Lewes's concern to provide 'plain directions' – simple, practical instructions – is a useful reminder that the natural history was primarily a set of practices, not a collection of ideas. Natural history was something you *did*, and the main use of books was to find out how to pin a butterfly, preserve a seaweed, press a flower or stuff a bird. The overwhelming majority of these books are ignored by historians, who focus on the unrepresentative handful whose authors developed complex and controversial theories about life, books like the *Origin*. Fascinating though such works are, it is important to remember that their authors and readers had to master natural history's practices first.

Budding naturalists had to learn how to collect. They might learn from books, from friends with similar interests, or by trial and error, but learn they must, since a collection was one's entrée into the world of natural history, a mark of one's growing expertise, a source of duplicate specimens that could be exchanged with fellow enthusiasts. Darwin collected beetles while a student at Cambridge, and later recalled that 'No pursuit at Cambridge was followed with nearly so much eagerness or gave me so much pleasure as collecting beetles. It was the mere passion for collecting.'<sup>17</sup> During the 1840s, the British 'passion for collecting' was assisted by the newly introduced Penny Post (also made by possible by the railway network), which allowed specimens to be exchanged between naturalists in different parts of the country, expanding the scope and variety of a collection and making friends in the process.<sup>18</sup> If they wanted to join these informal associations, seaside naturalists needed to dry and preserve seaweeds, identify shells, or keep living specimens alive on the train journey back to the collector's aquarium. Would-be botanists would discover that even the seemingly straightforward business of picking and

<sup>16</sup> Lewes 1858: viii, 28–9. <sup>17</sup> Barlow 1958: 58–62. <sup>18</sup> Allen 1994; Secord 1994.

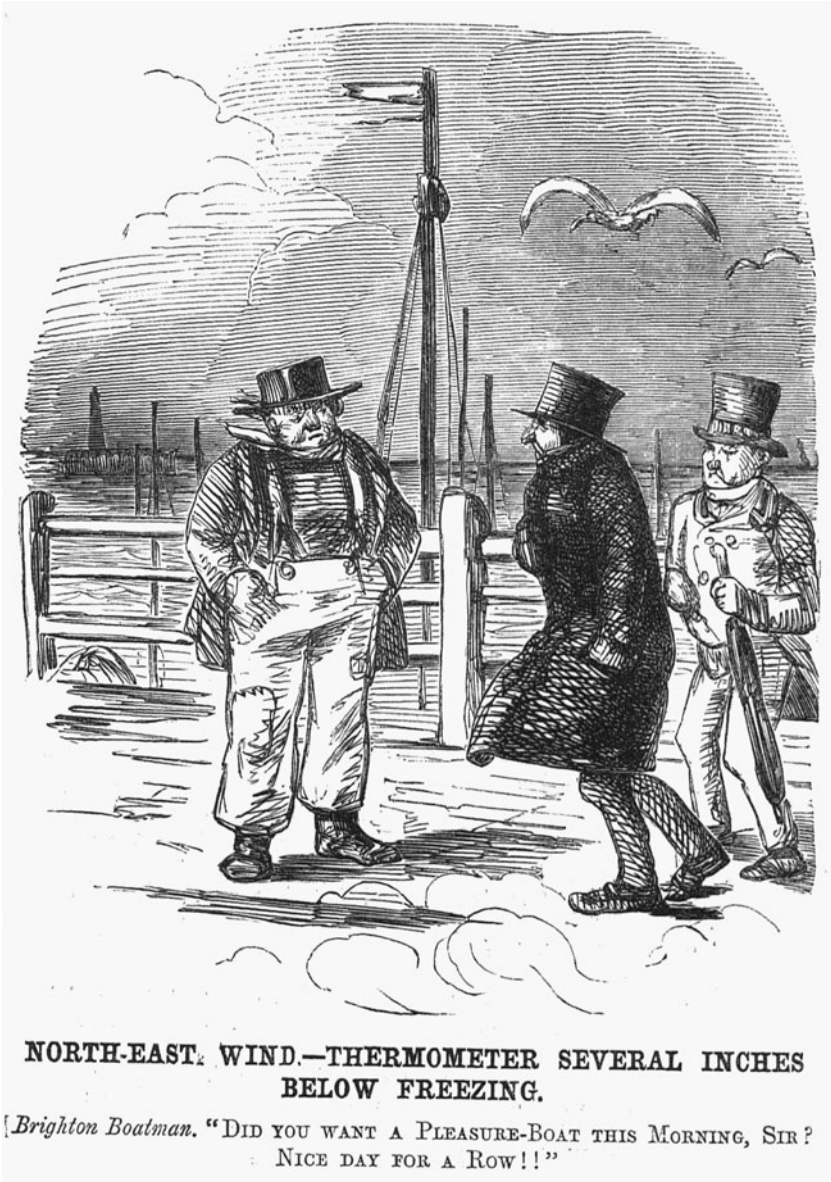


Figure 3. 'Nice day for a row': *Punch's* jaundiced view of the delights of the English seaside.

pressing flowers required considerable skill: identifying plants to ensure they were worth collecting and learning which tricks worked with different kinds of plants. Natural history required some specialist equipment: collecting tins, bags and boxes that suited particular kinds of specimens; microscopes and magnifying glasses; portfolios to hold pressed plants or sketches; jars to hold living sea creatures; a geologist's hammer to obtain rock specimens and fossils (Figure 4). Naturalists were identified by the tools of their respective trades and bore them with pride.<sup>19</sup>

Natural history was, as Lewes noted, regarded 'as an amusement, and as a science; the one being simply delight in natural objects, the other a philosophic enquiry into the complex facts of Life'.<sup>20</sup> It was largely because of this mixture of amusement and science that natural history became so popular, particularly with the Victorian middle classes. Exercise and fresh air were healthy, good for body and mind and delightful in themselves, but studying nature as one walked added purpose to pleasure.<sup>21</sup> Others were keen to contribute, in however modest a fashion, to the grander 'philosophic enquiry' of understanding the workings of living things. Lewes's book was unusual in that it gave an account of up-to-date scientific theories and even announced fresh discoveries, yet Lewes hastened to add that 'a style of popular exposition is adopted, which aims at being intelligible to all cultivated readers'.<sup>22</sup>

*Sea-Side Studies* was one of numerous practical guides that were intended to persuade readers to go out into nature and collect for themselves, whether they collected plants, animals, insects, fossils or shells. Seaside natural history alone produced dozens of examples, such as Charles Kingsley's *Glaucus; or, The Wonders of the Shore* (1855, Figure 5), which was also aimed at readers who might be about to set off 'perhaps, by railway, to pass your usual six weeks at some watering-place along the coast' and so were thinking 'more than once, and that not over-cheerfully, of what you shall do when you get there'. Kingsley suggested that his readers might both avoid the temptations that came with idleness and enhance the pleasure of their break by examining

<sup>19</sup> Endersby 2008: 54–83.    <sup>20</sup> Lewes 1858: viii, 28–9.

<sup>21</sup> Allen 1994: 69–71.    <sup>22</sup> Lewes 1858: viii.



*Figure 4.* Darwin's microscope, which he used when dissecting barnacles.

God's handiwork, particularly the animals and plants that he had made. Kingsley suggested that 'there must surely be many a thing worth looking at earnestly, and thinking over earnestly, in a world like this, about the making of the least part whereof God has employed ages and

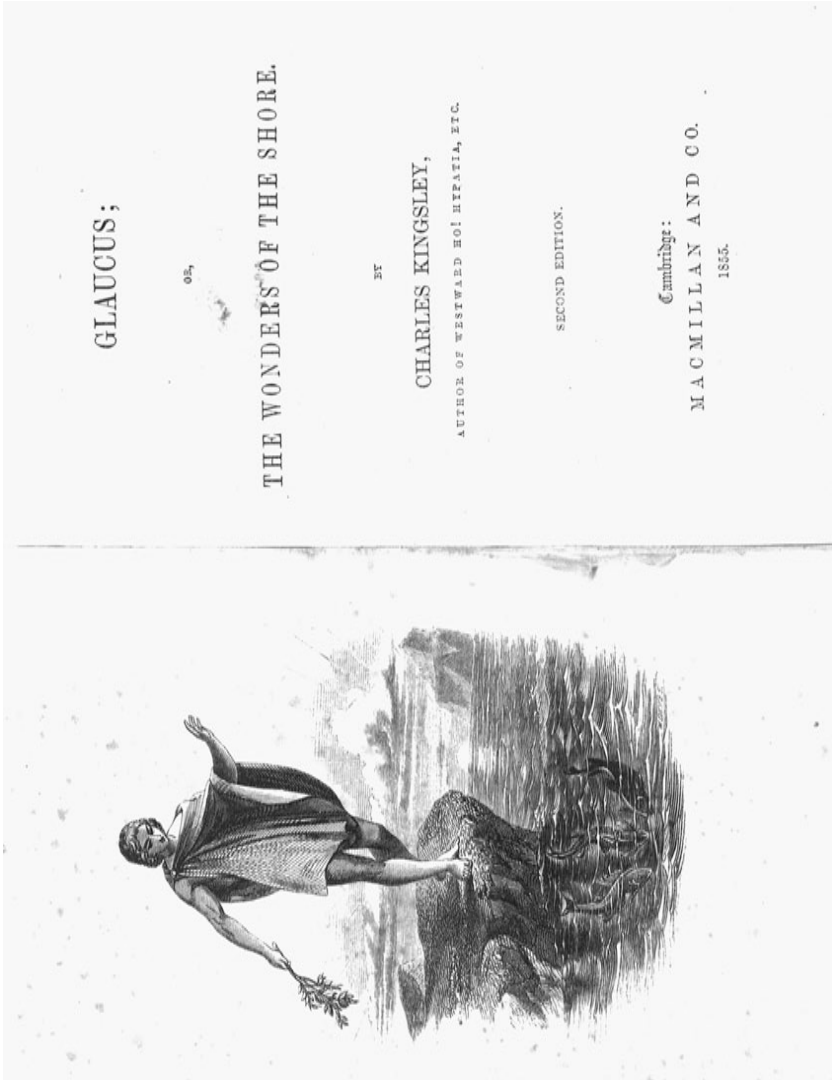


Figure 5. Title and frontispiece from Charles Kingsley's *Glaucus; or, The Wonders of the Shore* (1855).

ages'.<sup>23</sup> Natural history meshed comfortably with the widespread English enthusiasm for natural theology, the argument that through reason and experience we can discover that the natural world embodies evidence of both God's excellence as a craftsman and of his benevolence towards his creation. Religious motivations were common among naturalists of all denominations and classes.

The common passion for natural history produced an equally widespread expertise; when Darwin wanted a plant, insect or barnacle from some distant part of the country, or the empire, he could be sure to find some local naturalist happy to supply it or answer a question for him. The global reach of Darwin's networks of correspondents was dependent on the empire, just as his own travels had been. The *Beagle* was a naval surveying ship, its primary purpose to produce more accurate maps that would allow British ships, naval and merchant, to sail more safely and profitably; without the rapid growth in the empire over the previous decades, and the British government's desire to keep ahead of its rivals, the *Beagle* would never have sailed. In the years following his voyage, imperial networks remained vital: if Darwin wanted information about the plants of Britain's colonies in Australia, for example, he could write to Ferdinand Mueller, director of the Melbourne Botanic Gardens.<sup>24</sup> If he wanted to know about New Zealand, no less a person than the governor, Sir George Grey, would happily oblige.<sup>25</sup> When South Africa interested him, he could write to Edgar Leopold Layard, another civil servant who had settled in Cape Colony and founded the South African Museum.<sup>26</sup> Darwin was well known to those with an interest in science even before the *Origin* appeared, but he could also draw on his many friends among prominent British naturalists to supply a letter of introduction. Darwin's close friend, the botanist Joseph Hooker, provided introductions to many other botanists.<sup>27</sup>

A series of technological shifts transformed every branch of natural history as profoundly as they did every other aspect of Victorian Britain: the growth of the railways (and with them, cheaper postal services); the

<sup>23</sup> Kingsley 1855 (1887): 1–3.

<sup>24</sup> C. Darwin to F.J.H. von Mueller, 8 Dec. [1857]: Burkhardt and Smith 1990: 501.

<sup>25</sup> C. Darwin to G. Grey, 13 Nov. 1847: Burkhardt and Smith 1988: 95–6.

<sup>26</sup> C. Darwin to E.L. Layard, 8 June [1856?]: Burkhardt and Smith 1990: 237–8.

<sup>27</sup> For Mueller, see Moore 1997; Home *et al.* 1998, 2002, 2006.

advent of the steam-printing press; and, the myriad changes brought about by the rapid growth of factory-based mass production. The railways brought students of nature to the countryside and the steam-powered presses taught them what to look for. Improved shipping and the spreading telegraph network made communications throughout the empire faster and more reliable. And, as the market for natural history equipment grew, prices fell, which made nature studies ever more affordable and attractive; 'wretched' microscopes like the one Darwin used at Edinburgh had been supplanted by mass-produced, cheap powerful models which many naturalists could afford. These changes were echoed across much of the globe; empire and industrialisation created several of the conditions that made the *Origin* possible.

## 2 VESTIGES OF CONTROVERSY

The *Origin* was published in November 1859 and was an immediate success with book-buyers. How might someone who bought the first edition of Darwin's book have gone about reading it?

At a time when formal scientific credentials were still rare in Britain, establishing one's expertise could be difficult and one of Darwin's chief goals was to persuade his readers that he knew his subject and was competent to tackle such a complex (and potentially explosive) topic: an attempt 'to throw some light on the origin of species – that mystery of mysteries, as it has been called by one of our greatest philosophers'. This process of persuasion began on the book's title page, which listed Darwin's qualifications, beginning with his Cambridge MA, and adding that he was 'Fellow of the Royal, Geological, Linnaean, etc., Societies; author of "Journal of Researches during H.M.S. Beagle's voyage round the world".' Thanks in part to the success of his *Journal of Researches* (the *Voyage of the Beagle*, as it is now known), Darwin's name was already well known to the educated public.

For Darwin, establishing his expertise was in part a question of creating a contrast with one of the books to which the *Origin* would inevitably be compared; the anonymous best-seller *The Vestiges of the Natural History of Creation* (1844). The *Vestiges* offered a powerful vision of progressive development, a cosmic evolutionism that encompassed everything from the stars and planets to insects and humans. Its

sensational success ensured that such ideas had been widely discussed in the previous fifteen years, and *Vestiges*, then in its tenth edition, was still selling well.<sup>28</sup> It was inevitable that the two books would be compared; indeed, on the fourth page of his book, Darwin referred to what he thought were the implausible claims of the ‘the author of the “Vestiges of Creation”’, which Darwin regarded as ‘no explanation’ at all.

Darwin’s scepticism about *Vestiges*’ science was widely shared; scientific critics routinely accused ‘Mr. Vestiges’ of ignorance, of dabbling in second-hand science he barely understood. In 1854, the *British and Foreign Medico-Chirurgical Review* had described *Vestiges* as ‘a mass of pretentious nonsense’, whose numerous errors were only to be expected given that it was a ‘lumber-room of second-hand furniture’. The reviewer doubted that ‘the author ever performed an experiment or made an observation in any one branch of science’.<sup>29</sup> It was this audience of scientific specialists that Darwin particularly needed to impress and his previous publications and scientific qualifications helped ensure that his work would be better treated than *Vestiges*.

However, the most significant contrast between the *Origin* and *Vestiges* was that Darwin’s book had its author’s name on its title page while *Vestiges* remained anonymous, thus shielding its author from the consequences of expressing such controversial conclusions.<sup>30</sup> By putting his name to his book Darwin not only gave it credibility among scientific specialists, but brought his own social standing into play, which was at least as important for the wider, educated public he hoped to address. The tone of many reviews of *Vestiges* reflected reviewer’s confidence that, whoever the author was, he was not a reputable gentleman of science and could thus be insulted with impunity. Darwin’s vital scientific status was reinforced by his stature as a respectable middle-class gentleman; both protected the *Origin* from the more aggressive discourtesies heaped on the unknown author of *Vestiges*.

When Cambridge University’s professor of geology, Adam Sedgwick (who had taught Darwin geology), systematically demolished *Vestiges* in

<sup>28</sup> [Chambers] 1844 (1994); Secord 2000; Lightman 2007: 219–94.

<sup>29</sup> [Huxley] 1854: 425, 38.

<sup>30</sup> The author was the Edinburgh publisher Robert Chambers, but while his identity was increasingly widely suspected it was not formally acknowledged until after his death.



the prestigious *Edinburgh Review* he too drew attention to the anonymous author's lack of expertise, by claiming that 'the ascent up the hill of science is rugged and thorny', and was thus a path that could only be climbed by experts who had fully mastered their subject and demonstrated their expertise.<sup>31</sup> However, Sedgwick was not just a man of science, but also of the church – like many leading British academics he was an ordained minister in the Church of England. And, like many of his fellow churchmen, he hated what he saw as *Vestiges'* religious implications; describing the book in a private letter as 'a filthy abortion', he announced the goal of his review as being to crush the book with 'an iron heel', so as to 'put an end to its crawlings'.<sup>32</sup>

Sedgwick's review was one of the most extreme to greet *Vestiges*, but there were many others almost as hostile. For churchmen, *Vestiges* was an attack on Christianity. Despite its tone of apparent piety, the book clearly argued that humans had developed from lower animals by natural (as opposed to supernatural) means. If we were not made in God's image, and did not possess immortal souls, there was no salvation, no life everlasting. Sedgwick went so far as to argue that if *Vestiges* was true, Christianity was a lie.

Such religious concerns were exacerbated by Britain's political instability at the time *Vestiges* was published, in the middle of the 1840s; high corn prices and unemployment fuelled both crime and organised political protests, notably those of the Chartist movement, which demanded universal male suffrage and a host of related reforms that were intended to end the power of the aristocracy and their allies. Political unrest regularly spilled over into riots which Britain's police force, still in its infancy, struggled to control. The threat of revolution seemed all too real and the church was regarded as one of the most effective obstacles in its path. Rioters, it was to be hoped, might be deterred by the fear of damnation and by the perception that the social order was a natural one, ordained by God.

In 1848, as revolutions spread across Europe and several hundred thousand working-class men joined the largest Chartist demonstration

<sup>31</sup> [A. Sedgwick], 'Natural History of Creation', *Edinburgh Review* 82 (July 1845): 1–85. Quoted in Secord 2000: 243.

<sup>32</sup> A. Sedgwick to M. Napier, 10 Apr. 1845. Quoted in Secord 2000: 242.

ever organised, the hymn-writer Cecil Alexander summed up the establishment's view of God's order:

The rich man in his castle, the poor man at his gate,  
 God made them high and lowly, and ordered their estate.<sup>33</sup>

Alexander hoped to remind people of their proper place in the world; social classes, like everything else in the world, had been created by God, and it was blasphemous to try and change them. In a period when church and state were closely intertwined, any book that seemed likely to undermine religion would inevitably be condemned by those in power. Darwin had watched the storm that greeted *Vestiges* with considerable concern; a respectable, property-owning gentleman, he had no wish to provoke revolution or to offend his mentors, friends and fellow gentlemen.

Yet despite Darwin's care, the *Origin* could not avoid causing religious controversy. When the *North British Review* examined the book it commented that the *Origin* was being 'frowned down in churches' where it was seen as 'a second edition of *Vestiges*'.<sup>34</sup> Nevertheless, it is easy to exaggerate the religious hostility that greeted the *Origin*. When the Reverend Charles Kingsley, the vicar of Eversley in Hampshire, received his copy he wrote to tell Darwin that he had 'gradually learnt to see that it is just as noble a conception of Deity, to believe that he created primal forms capable of self development into all forms ... as to believe that He required a fresh act of intervention to supply the lacunas wh[ich] he himself had made'.<sup>35</sup> This sentiment pleased Darwin so much that he included an extract from the letter in subsequent editions of the *Origin*.<sup>36</sup> Kingsley's opinion and Darwin's reaction to it should cause us to question the idea that the *Origin* necessarily created or exacerbated a conflict between science and religion in Victorian Britain.

The controversy that greeted *Vestiges* may have influenced Darwin's decision not to publish his own theory too hastily. He spent many years

<sup>33</sup> 'All Things Bright and Beautiful', from *Hymns for Little Children* (1848).

<sup>34</sup> [Duns] 1860: 455.

<sup>35</sup> C. Kingsley to C. Darwin, 18 Nov. 1859; Burkhardt and Smith 1991: 380.

<sup>36</sup> Peckham 1959 (2006): 748.

gathering more data to support his theories, a delay that perhaps had the added benefit of allowing the political instability of the 1840s to subside. In the introduction to the *Origin*, Darwin told his readers that he had been working on his theory for over twenty years, having begun 'patiently accumulating and reflecting on all sorts of facts' in 1837, after his return from the *Beagle* voyage. He had produced a sketch of his conclusions in 1844, and been working on the theory 'from that period to the present day'. He nevertheless considered the work unfinished, but had decided to publish the *Origin*, which he regarded as no more than an 'abstract' of the longer book he planned, because another naturalist, Alfred Russel Wallace, had 'arrived at almost exactly the same general conclusions that I have on the origin of species'. Darwin asked his reader to excuse him for 'entering on these personal details', explaining that he gave them purely 'to show that I have not been hasty in coming to a decision'.

Some of Darwin's Victorian readers (like many since) must have wondered why he had delayed publication for so long. If the outline of the theory was complete in 1844, why wait another fifteen years? As Darwin acknowledged, it was only the receipt of Wallace's paper, announcing a largely similar theory, that persuaded him to publish in 1859; without Wallace's intervention, several more years might have elapsed (although Darwin had in fact only been working on his 'big species book' since 1854). One reason for putting off writing the big species book, which very few of his contemporaries would have known about, was that Darwin's theory was not in fact complete in the mid-1840s; he made several important modifications to it before it finally appeared.<sup>37</sup> However, what Victorian readers might well have known was that Darwin had published four monumental volumes on living and fossil barnacles, for which the Royal Society of London had awarded him their prestigious Royal Medal.<sup>38</sup>

The eight years that Darwin had spent classifying barnacles were also, in part at least, a response to the reviews that had greeted *Vestiges* when it first appeared in 1844 (when Darwin was writing his brief summary of his own theory). As we have seen, the unknown author's evident lack of first-hand expertise in science was a particular focus of

<sup>37</sup> See Browne 1980. <sup>38</sup> Darwin 1851b; Darwin 1854a; Darwin 1851a; Darwin 1854b.

criticism. At this stage in his career, Darwin had published a successful travel narrative and some well-received work on geology, but no detailed descriptive work on animals or plants; he had not classified the *Beagle's* specimens himself, but had distributed them among acknowledged experts in various specialisations. Since classification was understood to be the foundation of all other natural historical research it was important to demonstrate one's expertise in it. Darwin told his friend Joseph Hooker, who had classified Darwin's Galapagos plants and was one of the very few who knew of Darwin's species theory, that:

Lamarck is the only exception, that I can think of, of an accurate describer of species at least in the invertebrate kingdom, who has disbelieved in permanent species, but he in his absurd though clever work has done the subject harm, as has M<sup>r</sup>. *Vestiges*, and, as (some future loose naturalist attempting the same speculations will perhaps say) has M<sup>r</sup>. D. –<sup>39</sup>

Darwin was evidently concerned that his book would be subjected to the same scorn as were Lamarck's ideas (especially in Britain) and those of *Vestiges*. These worries are apparent in a series of letters in which he and Hooker discussed another recent speculative work on species by the French naturalist Frédéric Gérard. Hooker had recently returned from a voyage of his own and was in the process of classifying the plants he had gathered during four years afloat, meticulously comparing them to the vast collections at the Royal Botanic Gardens, Kew, where Hooker's father was director. Hooker was contemptuous of people like Gérard, whom he described as 'neither a specific naturalist, nor a collector, nor a traveller'. Before a naturalist was really qualified to speculate on such potentially dangerous topics, Hooker felt it was essential that to 'have handled hundreds of species with a view to distinguishing them & that over a great part, – or brought from a great many parts, – of the globe'.<sup>40</sup> Darwin replied 'How painfully (to me) true is your remark that no one has hardly a right to examine

<sup>39</sup> C. Darwin to J.D. Hooker, [10 Sept. 1845]: Burkhardt and Smith 1987: 253. See also Burkhardt and Smith 1987: 253n4.

<sup>40</sup> J.D. Hooker to C. Darwin, 14 September 1845. See also J.D. Hooker to C. Darwin, [4–9 Sept. 1845]: Burkhardt and Smith 1987: 250, 54.

the question of species who had not minutely described many.<sup>41</sup> This was a key reason why Darwin decided to spend the next eight years classifying barnacles – ‘from all over the globe’, just as Hooker had demanded: he needed to establish his right to examine the question of species.

Classifying barnacles relied on dissecting, analysing and comparing species, and Darwin’s barnacle researches illustrate the impact on natural history of some of the changes discussed above. Like his fellow naturalists, Darwin used the post to ask questions, exchange information and gather specimens. The first of his barnacle books lists those whose help he had relied on; there are almost thirty names, ranging from distinguished American and German professors to clergymen, merchants, distillers and sail-makers. For each of Darwin’s many publications, including the *Origin*, he assembled a similarly varied network of correspondents who were vital to his work.

Darwin’s correspondents were a diverse group, few of whom were paid to practise science. Paid scientific positions were still rare and the respectability of filling them was somewhat doubtful; part of the definition of a gentleman was that he did not work for a living, which guaranteed his disinterestedness and truthfulness. These ideals were an essential part of the man of science’s claims to respectability and public trust. As a result, many in the scientific community regarded those who, like Darwin, did *not* earn their living from science as the elite of the scientific world.

Partly because they were assumed to be independently wealthy, gentlemen were also expected to be generous, and Darwin benefited greatly from the generosity of his fellow gentlemen of science. One example was Albany Hancock, from Newcastle, who had originally been a solicitor but retired from the law to devote himself to natural history. He never held any paid or formal scientific positions, so presumably he either made or inherited enough money to live on. He published more than seventy scientific papers, many on molluscs, and Darwin acknowledged his kindness and that of ‘several other gentlemen’, to whom he was ‘greatly indebted for specimens and

<sup>41</sup> C. Darwin to J.D. Hooker, [10 Sept. 1845]: Burkhardt and Smith 1987: 253. See also: Burkhardt and Smith 1987: 253n4.

information'.<sup>42</sup> Darwin had first written to Hancock in 1849, when the latter published a paper describing his discovery of a new species of barnacle. Darwin acknowledged that 'I have no sort of pretension to claim any favour from you, but if you could at any time spare me one or two specimens in the shell, preserved in Spirits, it would be the most material kindness.' He promised not to 'publish anything so as to interfere with any further researches [Hancock] might choose to make on the species'.<sup>43</sup> Hancock must have replied immediately, since a week later Darwin wrote again offering thanks 'for your very kind letter & offer of specimens'.<sup>44</sup> The two men corresponded for many years afterwards and Hancock's generosity continued; in 1853 he apologised for not having 'not yet succeeded in preserving more specimens' of a species Darwin was interested in, but added that he would 'assuredly have a supply this spring – I have spoken to two gentlemen who live on the coast and they have promised to do their best'.<sup>45</sup>

The same courtesy and generosity was exhibited by the majority of naturalists, including those whose expert toes Darwin appeared to be treading on. Darwin's greatest barnacle debt was to John Edward Gray, keeper of the zoological department at the British Museum, who had a long-standing interest in the creatures and had planned to write a monograph on them himself until Darwin got interested. Far from resisting Darwin's intrusion into his province, Gray went out of his way to help, and Darwin publicly acknowledged the 'disinterested manner' in which Gray had assisted him:

Mr. Gray most kindly gave me his strong support, when I applied to the Trustees of the British Museum for the use of the public collection; and I here most respectfully beg to offer my grateful acknowledgments to the Trustees, for their most liberal and unfettered permission of examining, and when necessary, disarticulating the specimens in the magnificent collection.<sup>46</sup>

<sup>42</sup> Darwin 1851b: vii.

<sup>43</sup> C. Darwin to A. Hancock, [21 Sept. 1849]: Burkhardt and Smith 1988: 254.

<sup>44</sup> C. Darwin to A. Hancock, 29 Sept. [1849]: Burkhardt and Smith 1988: 257.

<sup>45</sup> A. Hancock to C. Darwin, 25 Feb. 1853: Burkhardt and Smith 1989: 121.

<sup>46</sup> Darwin 1851b: v.