ON THE ORIGIN OF SPECIES
THE SCIENCE CLASSIC

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CHARLES DARWIN
WITH AN INTRODUCTION BY JOHN VAN WYHE

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The Science Classic

CHARLES DARWIN, M.A.

With an Introduction by
JOHN VAN WYHE

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This edition first published 2020

The material for *On the Origin of Species* is based on the first edition, published by John Murray, London, and is now in the public domain. This edition is not sponsored or endorsed by, or otherwise affiliated with the Darwin families or heirs.

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John Wiley & Sons Ltd, The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, United Kingdom

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A catalogue record for this book is available from the Library of Congress.

A catalogue record for this book is available from the British Library.

ISBN 978–0–857–08847–5 (hardback) ISBN 978–0–857–08851–2 (ePDF)
ISBN 978–0–857–08850–5 (ePub)

10 9 8 7 6 5 4 3 2 1

Cover design: Wiley

Set in 10/15pt ITC New Baskerville by Aptara, New Delhi, India
Printed in Great Britain by TJ International Ltd, Padstow, Cornwall, UK

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AN INTRODUCTION

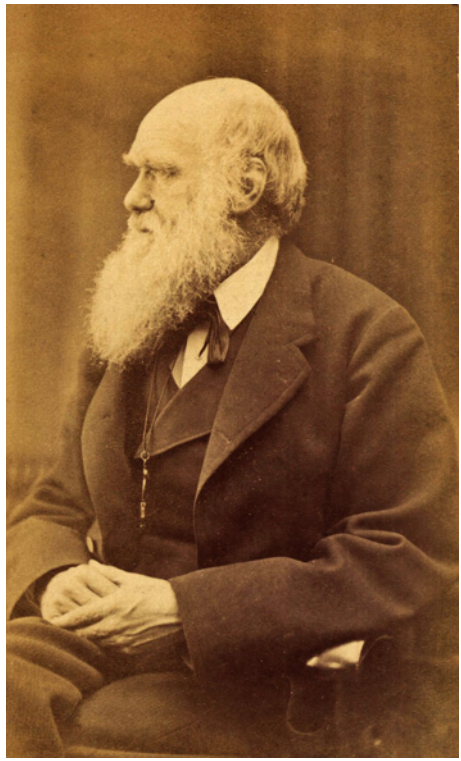
BY DR JOHN VAN WYHE

Charles Darwin transformed our understanding of life on Earth and our place in it forever. His theory of evolution by natural selection, now the unifying theory of the life sciences, explained where all of the astonishingly diverse kinds of living things came from and how they became exquisitely adapted to their particular environments and ways of life.

Darwin's theory also reconciled a host of diverse kinds of evidence such as the generally progressive fossil record, the curious geographical distribution of species, recapitulative appearances in embryos, homologous structures in different species, useless vestigial organs, and nesting taxonomic relationships. No other explanation before or since has made sense of these different classes of phenomena.

Darwin argued that species – that is the different types of organisms in the world – come not from multiple unique creation events on each island or particular place, but instead that species are the modified descendants of earlier species. He demonstrated that the source or origin of species could be entirely explained by descent from similar ancestors.

Even before Darwin entered the scientific scene, some crucial advances had been made in the study of the Earth and the fossil remains of ancient life it contains. These pre-Darwinian geologists and



palaeontologists, virtually all of them pious Christians, had discovered that the world was not a few thousand but countless millions of years old. So before Darwin ever sailed on the *Beagle* it was almost universally accepted by Western naturalists that the world was unimaginably ancient and that countless eras of life had come and gone in succession. It was also known that the fossil record was, broadly speaking, progressive. In the oldest rocks there were simple shells, then came fish with no bones like sharks, then bony fish, then amphibians, then reptiles, and finally mammals. Each era had had its own characteristic forms of plants and animals. When a species vanished from the fossil record, it never returned again. Species had gone extinct again and again.

Today, this sounds remarkably like an evolutionary understanding of the history of life on Earth. But, despite growing knowledge, the naturalists of that time were mostly extremely prejudiced against any form of evolutionary explanation. Where did they think species found in the subsequent eras came from? Initially it was believed that new species were somehow created (either supernaturally or naturally) to suit new environments. There was no real theory to make sense of the new evidence.

Darwin appeared, then, in a scientific and social context in which the pieces were in place for someone to knit them all together.

EARLY LIFE AND EDUCATION

Charles Robert Darwin (1809–82) was born the fifth of six children into a wealthy Shropshire family in the small market town of Shrewsbury. His father, Robert Waring Darwin (1766–1848), was a successful physician and financier and son of the famous poet, Erasmus Darwin (1731–1802). Charles Darwin's mother, Susannah Wedgwood (1765–1817), was the daughter of the famous potter. She died when he was eight years old. Darwin, watched over by his elder sisters and maidservants, grew up amidst wealth, comfort, and country sports. He attended the nearby Shrewsbury Grammar School as a boarder from 1818 to 1825.

In October 1825, Darwin went to Edinburgh University with his elder brother Erasmus to study medicine with a view to becoming a physician. While in Edinburgh Darwin investigated marine invertebrates with the guidance of a gentleman naturalist named Robert Grant. But it turned out that he had no inclination for medicine and could not bear the sight of blood or suffering. Darwin's father proposed the church as a respectable alternative. Although not particularly religious, the advantage to becoming a country parson, as Darwin saw it, would be the freedom to pursue his growing interest in natural history.

To become ordained in the Church of England it was necessary to first obtain a BA degree from an English university. So on 15 October

1827 he was admitted as a member of Christ's College, Cambridge. Darwin was never a model student, but he did become a passionate amateur naturalist. He began avidly collecting beetles along with fellow undergraduates, and he became the devoted follower of Professor of Botany John Stevens Henslow.

Through their close friendship Darwin learned a great deal about the practice of natural science. He passed his BA examination in January 1831. Shortly thereafter, during a tour of north Wales, he was taught the latest techniques of field geology by Professor Adam Sedgwick.

THE *BEAGLE* VOYAGE

Just at this time, Professor Henslow passed on to Darwin an alluring offer. Commander Robert FitzRoy (1805–1865) was planning a voyage on a Royal Navy survey ship, *HMS Beagle*, and was looking for a "scientific person" or naturalist.

It has become a commonplace in recent years to read that Darwin was not the official naturalist on the *Beagle* but actually the captain's companion. In fact, Darwin was officially appointed by the Admiralty, the governing body of the British Navy, to be the *Beagle*'s naturalist.

The round-the-world journey lasted five years. Darwin spent most of these years investigating the geology and zoology of the lands he visited, especially South America, the Galapagos islands, and Pacific oceanic islands. The *Beagle* eventually circumnavigated the globe, visiting New Zealand, Australia and South Africa on her return voyage.

Darwin was particularly influenced by the works of men of science like astronomer Sir John Herschel, traveller Alexander von Humboldt, and geologist Charles Lyell. Lyell's new book, *Principles of Geology* (1830–3), had a profound impact. Lyell offered not just a new view of geology but a new way of understanding nature. He showed how tiny, slow, gradual, and cumulative change over immense periods of time could produce vast changes. Lyell was seeking natural, visible, non-miraculous causes to explain natural phenomena. Darwin had the opportunity to witness all of these natural forces, such as erosion,

earthquakes, and volcanoes, during the *Beagle* voyage, and he became convinced that most of Lyell's views were correct. Darwin made several very important discoveries about the geology of South America, volcanic islands, and the origins of coral reefs by building on Lyell's ideas. He later wrote in the second edition of his *Journal of Researches* (1845):

> *Where on the face of the earth can we find a spot, on which close investigation will not discover signs of that endless cycle of change, to which this earth has been, is, and will be subjected?*

In addition to geology, Darwin collected organisms of all sorts in order to preserve a record of the living things of the places he visited. These formed the basis of the five-volume series he edited after returning home, *The Zoology of the Voyage of H.M.S. Beagle* (1838–43).

Darwin also unearthed many fossil creatures in South America. He wondered why these creatures resembled the present animals of that continent more than any other species on Earth. For example, a giant fossil mammal he discovered was covered with bony armour almost identical to armadillos, which lived only in that part of the world. Where had new species like the armadillo come from? Why should they be so similar to the long extinct creatures from the same place? Indeed, why was the world covered with so many different kinds of living things? Why were some very similar to one another and others vastly different? If species were somehow formed or created to fit their environments, as was then believed, why were jungle species so different in Asia, Africa, and South America despite the similarity of climate? Environment was obviously not the answer.

SEEDS OF A THEORY

Darwin did not conceive of a solution during the *Beagle* voyage, but rather a few years later in London, while writing on his travels and studying the mountain of specimens he had collected. Experts in London, such as the ornithologist John Gould, were able to tell him how many of the specimens of plants and animals he had collected in the

Galapagos Islands were unique species, found nowhere else. Yet they clearly closely resembled species from South America 600 miles away. It seemed to Darwin as if stray migrants from South America had come to the Galapagos, after the islands rose from the sea as bare rocky volcanoes, and then changed over time in isolation. Contrary to the popular myth, the island's famous finches (now called Darwin's finches) had no pivotal role in convincing Darwin that evolution must be true, nor did he appreciate or even suspect that their differently shaped beaks were adapted to different diets.

Darwin began to speculate on how new species could arise by natural observable causes. This led him to investigate some unconventional evidence. He made countless inquiries of animal breeders, both farmers and hobbyists like pigeon fanciers, trying to understand how they made distinct breeds of plants and animals through selection. Gradually Darwin concluded that organisms were infinitely variable, and that the supposed limits or barriers to the amount a species could change was a belief without foundation. One conventional view of the time was that species had been created where they are now found, to accord with their environment. Few men of science then held to the view that there had been only a single species creation event. This had come to be seen as a naïve and old-fashioned belief. The fossil evidence seemed to show that very many creations had occurred in different geological eras.

Darwin was heir to the same beliefs, but he wanted to explain how living forms changed over time. He was familiar with the evolutionary speculations put forward by his grandfather Erasmus Darwin and by the great French zoologist Jean-Baptiste Lamarck. But already Darwin's theorizing had extended in novel directions. He was thinking of the history of life not as a number of independent lineages somehow impelled to progress upwards from monads to monkeys. Instead, Darwin came to see all life as a single genealogical tree, branching and re-branching in all directions, depending on the circumstances. Thus similarities between different kinds of living things would be expected from their joint ancestry or common descent. Darwin's speculations

and early theorizing were recorded in a series of notebooks similar to those he kept during the *Beagle* voyage. These show in remarkable detail how his outlook gradually changed to reach its mature form.

In September 1838, Darwin read Thomas Malthus's *Essay on the Principle of Population* (1798). Malthus argued that human population growth, unless somehow checked, would necessarily outstrip food production. He argued that population growth was geometrical. For example, two parents might have four children, each of whom could have four children, whose children could also have four children. Thus in four generations there would be an increase from 2 to 4 to 24 to 96 and so on.

Although Malthus was an economist and social theorist, Darwin was only interested in the parts of the book that dealt with population increase in animals. Darwin's theory was not, as so often claimed, influenced by economics. Animals did not succeed in breeding geometrically if their numbers were kept in check by natural limitations such as space, food, or predators. In other examples, where checks were absent, vast population explosions or plagues resulted. He realized that an enormous proportion of living things are always destroyed before they can reproduce. This must be true because any species would otherwise breed enough to fill the entire earth in a few hundred generations. Instead, populations remain roughly stable year after year. The only way this can be so is that most offspring (from pollen to seeds and eggs) do not survive long enough to reproduce.

NATURAL SELECTION: HOW AND WHY SPECIES EVOLVE

Darwin, already concentrating on how new varieties of life might be formed, suddenly understood that the key was whatever small differences allowed some to survive long enough to reproduce, next to those that did not. He came to call this open-ended collection of causes "natural selection" because it was analogous to the way farmers and breeders selected which individuals to breed from and thus changed a breed markedly over time.

Darwin wrote in his *Autobiography* in 1876:

> *In October 1838, that is, fifteen months after I had begun my systematic enquiry, I happened to read for amusement Malthus on Population, and being well prepared to appreciate the struggle for existence which everywhere goes on from long-continued observation of the habits of animals and plants, it at once struck me that under these circumstances favourable variations would tend to be preserved, and unfavourable ones to be destroyed. The result of this would be the formation of new species. Here, then, I had at last got a theory by which to work.*

All living things are slightly different, even from their closest relatives. Darwin realized that these small differences sometimes determine which creatures lived and which perished. Only the survivors could pass on their form and abilities. Their characteristics would persist and multiply whilst characteristics of those that did not live long enough to reproduce would decrease.

Darwin did not know precisely how inheritance worked – genes and DNA were totally unknown. Nevertheless, he appreciated the crucial fact of inheritance per se: offspring resemble their parents. He thought in terms of populations of diverse heritable things with no 'essence' – that is, not representatives of ideal types as many earlier thinkers had done. From his observations and experiments with domesticated and wild plants and animals he could find no limits to the extent organic forms could vary and change through generations. Thus the existing species in the world were related not along a metaphysical 'chain of being' or separated into artificially separate species categories but were all related on a genealogical family tree through "descent with modification".

Darwin also identified another means by which some individuals would have descendants and others would not. He called this sexual selection. This theory explained why the male sex in many species is larger, produces colourful displays, and has specialized body parts to attract females or to compete against other males with weapons.

Those males who defeat other males, or are selected for breeding by choosy females, leave more offspring and so subsequent generations resemble them more than those who succeed less often. As Darwin pointed out, "A hornless stag or spurless cock would have a poor chance of leaving offspring" (*Origin* p. 88).

MARRIAGE, ANNIE, AND RELIGIOUS BELIEF

In January 1839, Darwin married his cousin Emma Wedgwood (1808–96). He had deliberated about marrying, fearing it would impose on his time for scientific research. But, in a letter he wrote to Emma just before their marriage, he said: "I think you will humanize me & soon teach me there is greater happiness, than building theories, & accumulating facts in silence and solitude."

By 1842 they already had two children and were keen to withdraw from the coal smoke air pollution of London to the countryside. With some financial help from Darwin's father, they bought a large Georgian house with eighteen acres near the quiet village of Downe in Kent. Key attractions for Darwin were miles of walking paths in every direction and a "capital study". The Darwins saw it as a good place to raise a family, and for Darwin to continue his researches and write. They would make additions to the house, adding a hothouse in the garden to indulge Darwin's interest in the fertilization of orchids and to make other botanical experiments.

The Darwins would live in Down House (now a museum) for the rest of their lives. They had ten children, of whom seven survived to adulthood. Darwin's favourite daughter Anne Elizabeth, known as Annie, died tragically from disease (probably tuberculosis) in 1851. It was a "bitter and cruel loss". In recent years it has become widely believed that her death destroyed Darwin's faith in Christianity, or that he suddenly ceased attending church as a result of her death. But this is incorrect.

Darwin had "thought much upon religion" in the years 1836 to 1838 and very slowly and gradually came to disbelieve in Christianity. He found there was no evidence to support it. In his autobiography he

described this process as causing him no distress. The death of Annie, in contrast, was the most painful event of his life. While he ceased to believe in Christianity and its god, he never gave up a belief that a supernatural creator had made the universe and the laws of nature in the first place. However, like many like-minded men of his time, he was convinced that everything in nature was the result of natural laws. Thus, as far as we know, he was never an atheist.

AMASSING THE EVIDENCE

Darwin's acute and innovative books and articles had already forged for him a great reputation as a geologist, zoologist, and scientific traveller. His eight years' gruelling work cataloguing all of the world's barnacles, published 1851–4, enhanced his reputation as an authority on taxonomy as well as geology and the distribution of flora and fauna as in his earlier works.

Yet there is no evidence to allege, as is so often done, that Darwin felt he needed to supplement his reputation or skills before he could publish his species theory. Marine invertebrates had been of central interest for Darwin since his student days in Edinburgh. During the *Beagle* voyage a large proportion of his zoological notes were devoted to them, and he did not give this class of organisms to another expert to identify but kept them for himself. He consistently maintained in his letters that he would publish the theory come what may.

It is now clear that Darwin did not hold back or keep his belief in evolution a secret. The evidence from his surviving letters and notes shows that he discussed his ideas with many friends, family members, neighbours, and colleagues during the years before he published his book. Indeed, Darwin himself explicitly said so in the sixth and final edition of *Origin of Species*: "I formerly spoke to very many naturalists on the subject of evolution" (p. 424). Nor is there any foundation for the common belief that he was afraid of upsetting his religious wife. This is pure myth. She annotated his early theoretical drafts.

His full-time occupation before and long after he became an evolutionist in 1838 was the publication of his recollections and scientific

work resulting from the five-year *Beagle* voyage. This work would take him more than a decade to complete, as Professor Henslow had foretold. He conducted breeding experiments with animals and plants and corresponded and read widely for many years to refine and substantiate his theory of evolution. It took time to work out the many aspects of its implications and to solve problems with it as they arose. In 1842 he prepared a sketch outlining his theory as it then stood. This was greatly expanded in an essay written in 1844. After completing his work on barnacles, Darwin immediately turned to his theory to explain species in September 1854. By mid-1858 he was more than halfway through a large multi-volume work on the subject when he was interrupted by one of the most remarkable coincidences in the history of science.

DARWIN AND WALLACE: WHAT REALLY HAPPENED

Another Englishman, Alfred Russel Wallace (1823–1913), had been collecting specimens of animals and studying the biogeography of Southeast Asia since 1854. Wallace privately believed in some sort of evolutionary process but had never published his heterodox beliefs. But his views were at first very different from Darwin's. Wallace did not seek to explain adaptation. Instead he seems to have focused on the main feature of genealogical descent.

While staying on the remote island of Ternate in today's Indonesia, Wallace had a new idea that shifted his theories to align closely with Darwin's still unpublished views. Wallace drafted an essay to explain his new idea, drawing heavily on his reading notes and notebook speculations from the previous few years. He had independently hit on a form of natural selection to explain adaptation and species change. But when he finished it, he hesitated. Wallace was a relatively obscure collector with no prospect of a job when he returned home. And to publish a paper arguing for the then ridiculed idea of evolution was extremely risky.

When the monthly mail steamer arrived at Ternate in March 1858, Wallace received a letter of reply from his occasional correspondent,

Darwin. The letter was one of the most flattering Wallace had ever received. Not only did Darwin praise Wallace's earlier theoretical article, he mentioned that Wallace's hero, the great geologist Sir Charles Lyell, also found it interesting.

Wallace now had a new possibility before him. He knew from their correspondence that Darwin was working on evolution too. Since Wallace was not ready to, and did not, send his new essay to a journal, he could send it to Darwin and ask him to forward it on to Lyell if it was "sufficiently interesting". That was a Victorian euphemism which meant, if Darwin approved or thought it publishable. Yet Wallace had put the suggestion so politely that Darwin was under no obligation to publish something of which he might not approve. Wallace wrote Darwin a letter and enclosed his so-called 'Ternate essay' and left it at the post office before setting off on a great expedition to the wild shores of New Guinea in search of exquisite and lucrative birds-of-paradise. The letter was picked up on the April mail steamer and started its long fateful journey to Darwin.

When the letter reached Darwin, on 18 June 1858, he was quite shocked. Wallace's theory seemed to him to be exactly as his own. Historians now agree that there were in fact many differences. As Wallace knew, Darwin was then only about a year or two away from finishing his big book on his theory of evolution. He had come up with his own theory twenty years before Wallace. But he did approve of Wallace's essay and he felt honour bound to do as Wallace requested. So he forwarded the essay to Lyell the same day. Lyell could have chosen to publish it right away or send it back with or without comments. It was up to him now.

Lyell, quite a high society snob by all accounts, couldn't be bothered to reply for some time. Darwin had to chase him with more letters. In the end, he advised Darwin to just publish an overview of his own theory now, and publish his older, complete views any time he wished. But Darwin's conscience would not let him. He kept asking Lyell if he was sure this was the best course of action. In the end, Lyell's last letter of advice was passed (at Darwin's request) to their mutual friend, the botanist Joseph Dalton Hooker.

Hooker had a different idea that would be fair to both Wallace and Darwin. Hooker decided to present Wallace's essay together with some older documents by Darwin at the same scientific meeting under his own (Hooker's) and Lyell's names. And so it was that the modern theory of evolution by natural selection was first made public. These brief papers seem so historic now, but they were just too brief to make an impact or convert anyone. Therefore, if Wallace's essay had been published alone before Darwin's views, but Darwin had still published his book the following year, history would have been no different. Darwin had had a twenty-year head start. Wallace had originally thought that after he returned home (which turned out to be in 1862) he would then spend some years on the theory. So if he had ever written a book, it mostly likely would have been published a decade after Darwin's.

With an outline of his theory before the scientific community, Darwin's friends and colleagues urged him to publish an overview of his theory rather than making them wait for the large work to be perfected and completed. Darwin therefore spent thirteen months condensing his twenty years of materials into a single volume. Its full title was *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*. The world would never be the same again.

THE BOOK

The first edition of *On the Origin of Species* was printed in 1250 copies. Darwin chose to use his existing publisher, John Murray. The book had an introduction and fourteen chapters which totalled 502 pages, making it about 150,000 words long, excluding the index.

In the introduction, Darwin began by explaining how he came to doubt the permanence of species and how long he had been working on the subject. The brute facts of the similarities of different species, the similarities during embryological development of members of the same genus, the geographical distribution of species, the progressive succession of fossil forms and so on could indeed convince a naturalist that species change over time. But this would still be incomplete. One

would still need to explain how species changed and, most importantly of all, how they came to be so astonishingly adapted to their environments, and why they had immensely complex relationships with one another. Darwin's theory of natural selection explained how adaptation could occur, over many generations, given the commonly accepted but often overlooked properties of living things. The book was about how all species originate, not about the origin of any one species or the origin of life itself. Nor was it about human beings. Darwin did make it very clear, however, that humankind was part of nature. "Light will be thrown on the origin of man and his history," he writes.

THE EVOLVING *ORIGIN*

Darwin continued to revise the text of *Origin of Species* across the six British editions, and alterations were made to some of the foreign editions. In all, the British editions contain some 2250 changes in sentences (including sentences that were added and those that were removed) and more than 15,000 changes in words or phrases.

The first edition was published on 24 November 1859, the second in 1860, the third in 1861, the fourth in 1866, the fifth in 1869, and the sixth in 1872. Darwin made his final changes to the text in the printing of 1876. The third edition first carried the 2900-word "historical sketch of the recent progress of opinion on the origin of species" at the beginning. This gives a brief overview of the previous writers to offer evolutionary speculations or theories.

It was not until the fifth edition of *Origin of Species* that Darwin used the phrase "survival of the fittest". It was not even his own, having been coined by the philosopher Herbert Spencer, and adopted by Darwin at the urging of Wallace. Despite its fame, the phrase is now considered to be a very misleading shorthand for the theory. Again, perhaps surprisingly, the word "evolution" does not enter the *Origin* until a later edition: the sixth. This edition also included a new chapter to confute the views of the Roman Catholic biologist St George Mivart. It also included a "glossary of scientific terms" compiled by W. S. Dallas.

The first edition of the *Origin* is probably the best choice from the modern reader's point of view. It is the original statement of Darwin's views, and later editions became complicated as he responded to various criticisms. The text of the present volume is from the first edition of 1859 with the 'historical sketch' added from the third edition of 1861 as an Appendix. The entire text is reproduced from The Complete Work of Charles Darwin Online (http://darwin-online.org.uk/).

At the end of the first edition were pages of advertisements: "Mr. Murray's general list of works" dated June 1859 (the date differing in different copies). The adverts are omitted here.

For more detailed analyses of the *Origin* and its editions, see:

http://darwin-online.org.uk/EditorialIntroductions/Freeman_OntheOriginofSpecies.html

http://darwin-online.org.uk/EditorialIntroductions/Chancellor_vanWyhe_Origin1st.html

REACTIONS AND LEGACY

In zoology, taxonomy, botany, palaeontology, philosophy, anthropology, psychology, literature, and religion, *On the Origin of Species* provoked strong responses – many of which are ongoing. Most disturbing of all, however, were the implications for the cherished uniqueness of man. Although Darwin refrained from discussing the derivation of any particular species, including man, in the *Origin* he included – as we mentioned – the famous promissory sentence: "Much light will be thrown on the origin of man and his history".

Many people who read the book could think only about what this genealogical view of species meant for human beings. This is a subject Darwin later addressed at length in his books *The Descent of Man* (1871) and *The Expression of the Emotions in Man and Animals* (1872). In these brilliant and original works Darwin showed that there is no difference of kind between man and other animals, but only of degree. Rather than an unbridgeable gulf, Darwin showed there is a gradation of change not only between man and other animals, but between all

organic forms. This is a consequence of the gradual change continuously and cumulatively operating over time.

At first, *On the Origin of Species* was extremely controversial and some exceedingly negative reviews appeared. But Darwin's arguments and evidence were hard to resist. Remarkably, within fifteen to twenty years he was able to convince most of the international scientific community that descent with modification, or evolution, is a fact. Despite what many modern readers might encounter in popular literature or social media, the theory of evolution has not been scientifically contentious since the 1870s.

Darwin's name is so linked with evolution because the *Origin of Species* single-handedly convinced the international scientific community that evolution is a fact. As a result, Darwin became hugely famous as the man who had effected a scientific revolution with a single book. *Origin of Species* remains perhaps the most influential scientific book ever written. No other science book has been translated into more languages.

The book's final sentence remains one of the most poignant and far-reaching ever written in a scientific work:

> *There is grandeur in this view of life, with its several powers, having been originally breathed into a few forms or into one; and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being, evolved.*

Charles Darwin

Born 12 February 1809 in Shrewsbury, England, the son of Robert Waring Darwin and Susannah, née Wedgwood.

In 1817 his mother dies. The following year he goes to Shrewsbury Free Grammar School under Samuel Butler for seven years.

In 1825 he joins his brother Erasmus at the University of Edinburgh to study medicine.

Enrols at Christ's College, University of Cambridge, in 1828. He becomes a keen entomologist and collector of beetles, and attends John Stevens Henslow's botany lectures.

Passes his BA examinations in 1831 without honours. In August returns to Shrewsbury from a trip to Wales to find a letter from Henslow inviting him to join the *Beagl*e voyage. Darwin's father objects, but his uncle, Josiah Wedgwood II, persuades him otherwise. Meets Captain Robert FitzRoy and makes preparations for the voyage. After two false starts, the ship leaves Plymouth on 27 December.

The *Beagle* lands first in the Cape Verde Islands, then surveys the east coast of South America including Tierra del Fuego and the Falkland Islands. After spending time on the east coast, the *Beagle* ventures into the Pacific, visiting Tahiti, New Zealand, and Australia. Returns to England in 1836 having traversed the Atlantic including St Helena and Ascension Island.

In 1837 Darwin moves to London and reads papers before the Geological Society of London. Begins publication of *The Zoology of the Voyage of the Beagle* (1838–43).

In 1838 he proposes marriage to Emma Wedgwood. They marry in 1839, and in the same year Darwin publishes *Journal of Researches*, later known as *Voyage of the Beagle.* Elected a Fellow of the Royal Society.

In 1842, the family settle in Down House, Kent. Darwin publishes *The Structure and Distribution of Coral Reefs.* On a visit to

Emma's family home in Staffordshire, he makes a brief pencil sketch of his developing theory of 'descent with modification'.

In 1846 publishes *Geological Observations on South America*, and begins his work on barnacles. In 1851 publishes the first of two monographs on barnacles.

On Charles Lyell's advice, in 1856 Darwin begins writing up his evolutionary views for a projected big book called 'Natural Selection'. It is later condensed into a single volume published in 1859 as *On the Origin of Species*.

In 1862 he grows his famous beard. Publishes *On the Various Contrivances by which British and Foreign Orchids are Fertilised by Insects, and On the Good Effects of Intercrossing*. Meets his friend and colleague Alfred Russel Wallace on his return from Southeast Asia.

In 1864 awarded the Copley medal of the Royal Society of London, its highest scientific honour.

In 1868 visits the Isle of Wight and meets Alfred Lord Tennyson and Julia Margaret Cameron, who photographs him.

1871 sees the publication of *The Descent of Man, and Selection in Relation to Sex*. The following year the 6th edition of *Origin of Species* is published.

In 1875 publishes *Insectivorous Plants*, and in 1876 begins an autobiographical memoir.

Dies 19 April 1882. Buried at Westminster Abbey.

ABOUT JOHN VAN WYHE

John van Wyhe is a historian of science at the University of Singapore who specializes on Charles Darwin and Alfred Russel Wallace. He is the founder and Director of *Darwin Online* (http://darwin-online.org.uk/). He has published eleven books and lectures and broadcasts around the world.

ABOUT TOM BUTLER-BOWDON

Tom Butler-Bowdon is the author of the bestselling 50 Classics series, which brings the ideas of important books to a wider audience. Titles include *50 Philosophy Classics*, *50 Psychology Classics*, *50 Politics Classics*, *50 Self-Help Classics* and *50 Economics Classics.*

As series editor for the Capstone Classics series, Tom has written Introductions to Plato's *The Republic*, Machiavelli's *The Prince*, Adam Smith's *The Wealth of Nations*, Sun Tzu's *The Art of War*, Lao Tzu's *Tao Te Ching*, and Napoleon Hill's *Think and Grow Rich*.

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ON THE ORIGIN OF SPECIES BY MEANS OF NATURAL SELECTION,

Or the Preservation of Favoured Races in the Struggle for Life