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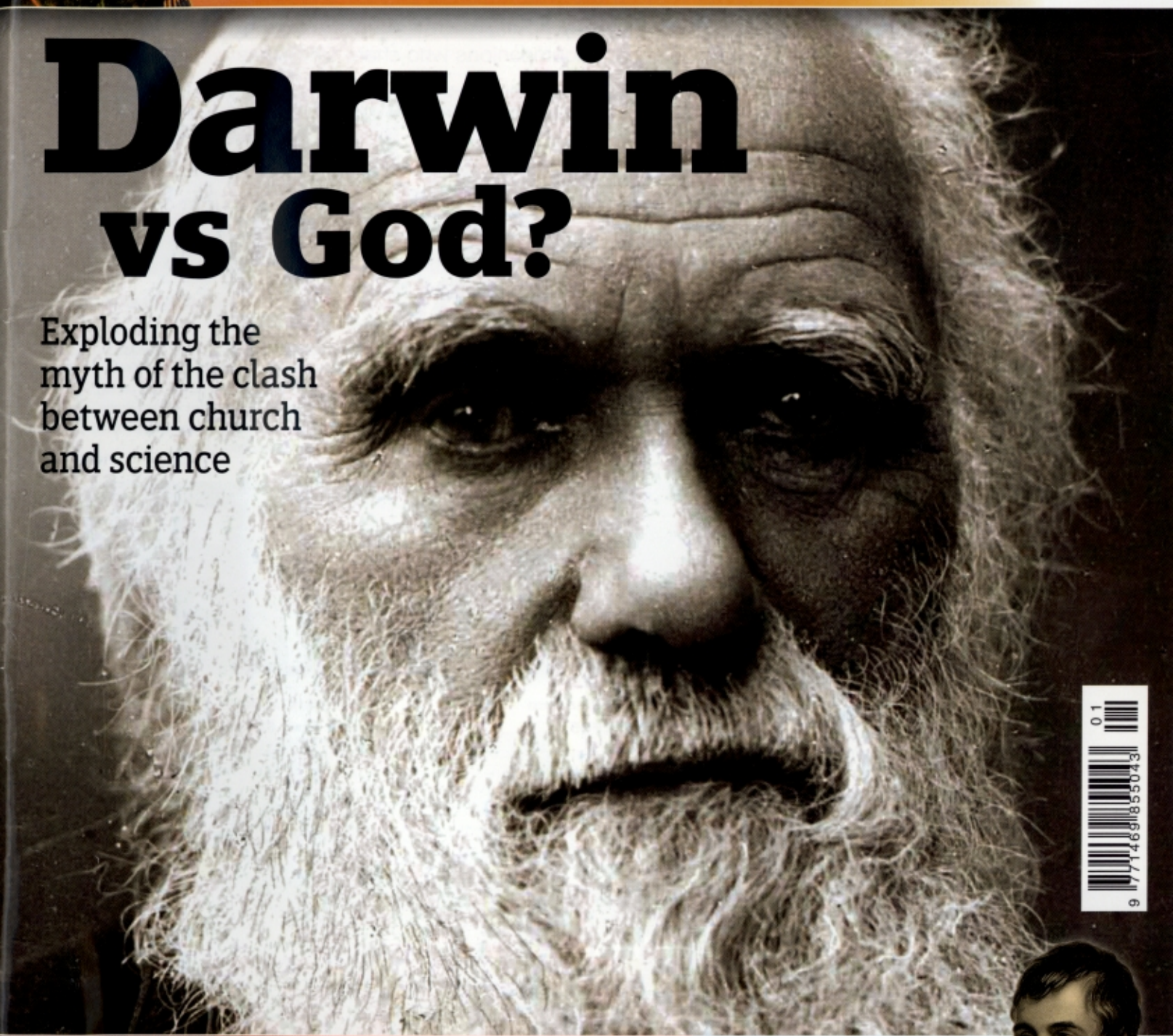
Darwin vs God?

Exploding the myth of the clash between church and science



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The 13th-century credit crunch

Robert Burns
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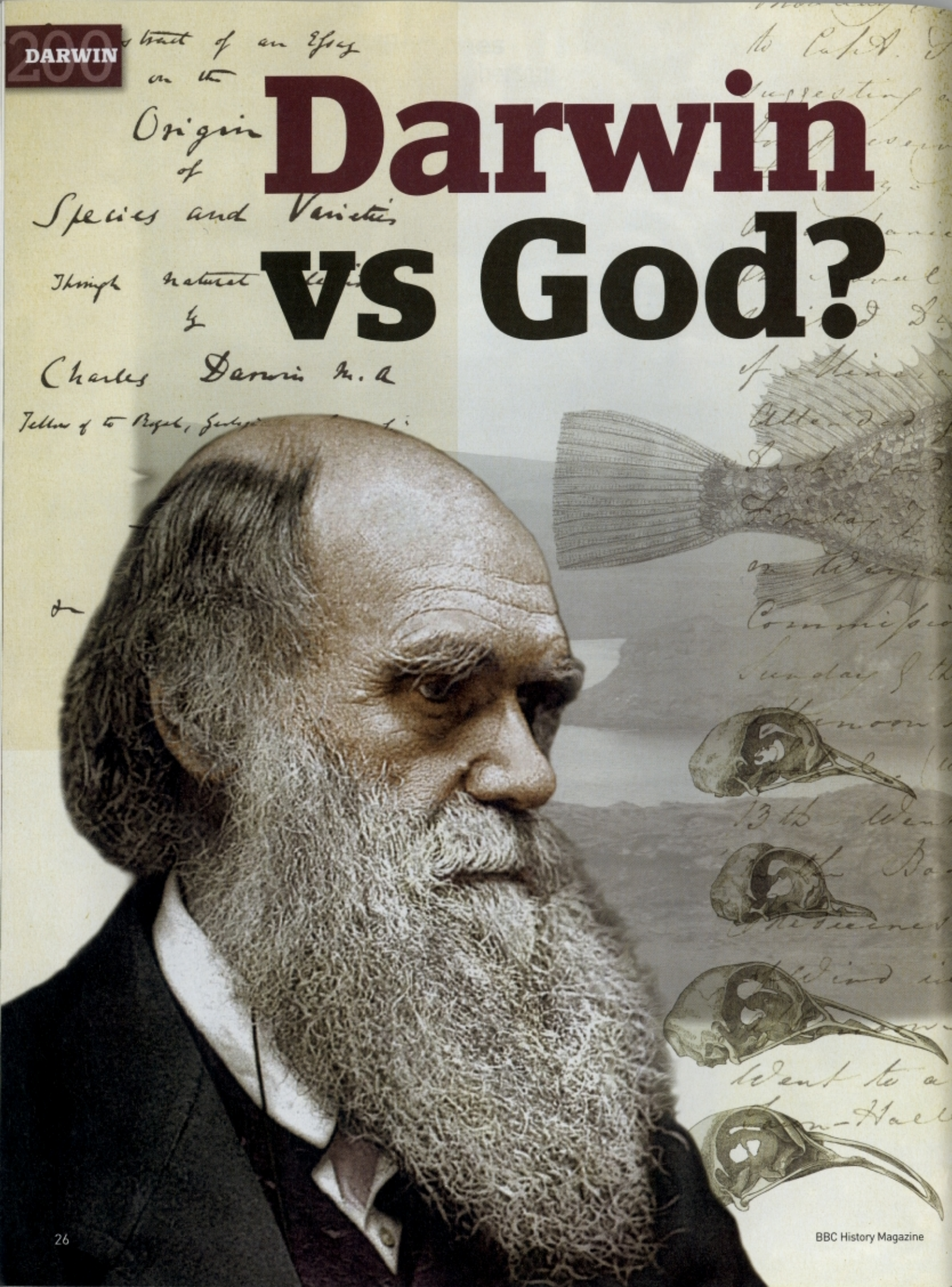
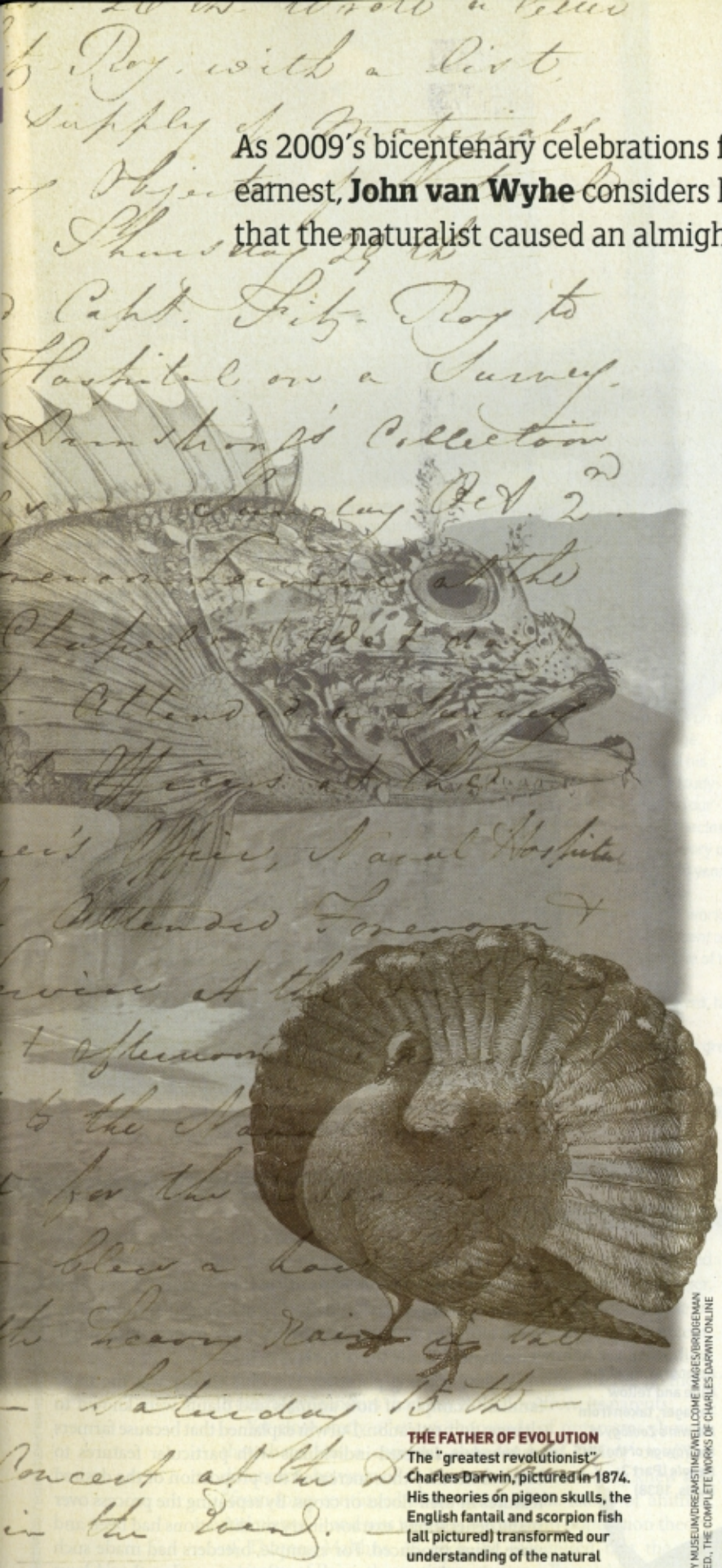
Darwin vs God?



As 2009's bicentenary celebrations for the birth of Charles Darwin begin in earnest, **John van Wyhe** considers how much truth there is in the belief that the naturalist caused an almighty clash between church and science



THE FATHER OF EVOLUTION
The "greatest revolutionist", Charles Darwin, pictured in 1874. His theories on pigeon skulls, the English fantail and scorpion fish (all pictured) transformed our understanding of the natural world. Yet, according to John van Wyhe, they did not directly question the existence of God

NATURAL HISTORY MUSEUM/DREAMSTIME/WELLCOME IMAGES/BRIDGEMAN
JOHN VAN WYHE ED., THE COMPLETE WORKS OF CHARLES DARWIN ONLINE

TWO HUNDRED years ago, Charles Darwin, the bearded Victorian sage on the ten pound note, was born. Many people believe he was the man who discovered we come from monkeys. Yet he did no such thing. Writers before Darwin had made connections between humans and apes and monkeys because of our obvious physical similarities. But the theory for which Darwin is so celebrated was not aimed particularly at human ancestry at all.

The implications of Darwin's theory – most famously espoused in 1859 in the *Origin of Species* – were so wide-ranging that a concise caricature of what it was all about was probably needed. "Darwin says we come from monkeys" was perhaps an understandable popular shorthand. It at least encapsulates both that species change and that the human species is derived from non-human ancestors. Of course it is also woefully inadequate since humans are no more descended from the monkeys we see around us today than you are from your own cousin.

Instead, Darwin set out to answer the question, how are new species formed? Where do they come from? What is their origin? His theory was not about the origin of life itself. Although Darwin believed that question too would turn out to have a perfectly natural explanation, he thought that it was then beyond the power of science to answer.

More fantasy than fact

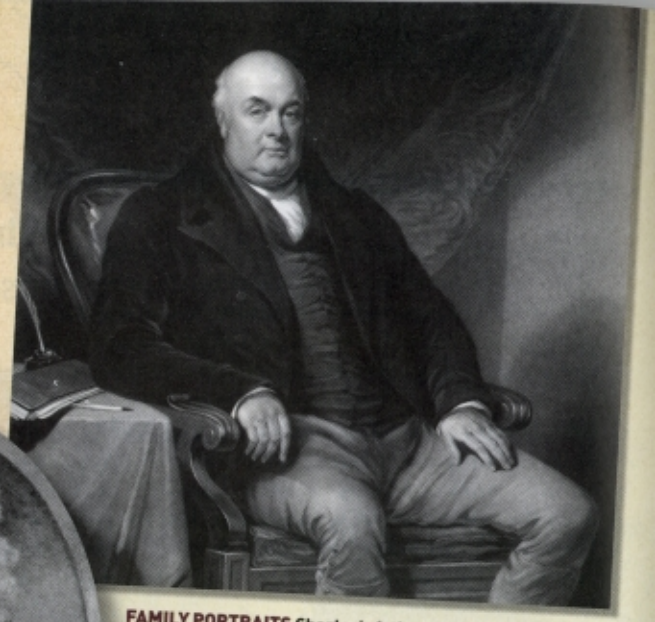
We often hear that when the *Origin of Species* was published there was a great outcry and an historic clash of science and religion. This is probably more fantasy than fact. Such stories can now be told and repeated only because we have forgotten just what was, and what was not, new and shocking in 1859. Much of what is commonly attributed to Darwin's book today had actually emerged in the half century or so before its publication. Such accounts assume that the *Origin of Species* not only proposed a new and ambitious theory of evolution, but that the Earth was more than 6,000 years, that there was a progressive fossil record – and that it also proposed the precise lineage of human beings. According to such legendary accounts all of this was presented to a blinkered and prejudiced public believing in the literal truth of *Genesis*. This would have been an historic clash indeed! But this is not what happened.

The Victorian public that first read or read about the *Origin of Species* were, for the most part, not biblical literalists. For decades the most enlightened writers in the fields of science and religion had accepted that much of the Old Testament, and *Genesis* in particular, had to be read in a metaphorical sense. Some believed that the creation story dealt only with the latest geological epoch – in which humanity appears on Earth. ➤

John van Wyhe is a historian of science at the University of Cambridge. He is the founder and director of Darwin Online, the world's largest online resource on Charles Darwin

The immensely ancient Earth was not Darwin's contribution, and it was not new. Geology had become a sophisticated science. No one knew how old the Earth was, but it was clear from the enormous numbers of geological formations that had been described and classified that so many long ages must have taken unimaginable lengths of time, millions upon millions of years. But no one knew how many. It was not until the discovery of radioactivity that accurate dating of rocks, and of the Earth itself, were feasible.

That fossil records revealed a succession of eras or ages of extinct 'living' things was also old news. It was almost universally accepted that these successive types of fossilised creatures were generally progressive through the oldest to the newest rocks. In the oldest rocks were the most primitive creatures. Shells preceded fish, which preceded amphibians, which preceded reptiles which preceded mammals. This was true wherever one went throughout the world. In fact the geological strata were dated according to which fossils they contained – because the order of succession had been worked out in great detail. No human fossils were known and hence these ancient worlds were believed to predate the creation of mankind.



FAMILY PORTRAITS Charles's father, Robert Waring Darwin (above), and his mother Susannah (left), who was the daughter of the famous potter Josiah Wedgwood

BROTHERLY LOVE A portrait of Darwin in 1816, aged six, with his sister Catherine. He later described his childhood as a happy one

According to Darwin, all living and extinct species were related on a single genealogical family tree known as the tree of life

The other common belief is that Darwin's book shocked Victorian religious and moral values. In fact most of the heat had already been spent over radically naturalistic works published in the preceding decades. Books like George Combe's *The Constitution of Man* (1828) and the anonymous *Vestiges of the Natural History of Creation* (1844) had shocked readers far more with their visions of natural laws that controlled all of the universe, mankind included, leaving virtually no place for God. The later work was an evolutionary tour de force that began with the creation of the solar system from swirling clouds of dust and ended with the prediction that mankind would go on progressing into something even more exalted.

These books were also read by huge audiences. By the end of the 19th century, *Vestiges* had sold around 40,000 copies and *Constitution* an impressive 300,000. In comparison the *Origin of Species* sold 50,000 copies by 1900.

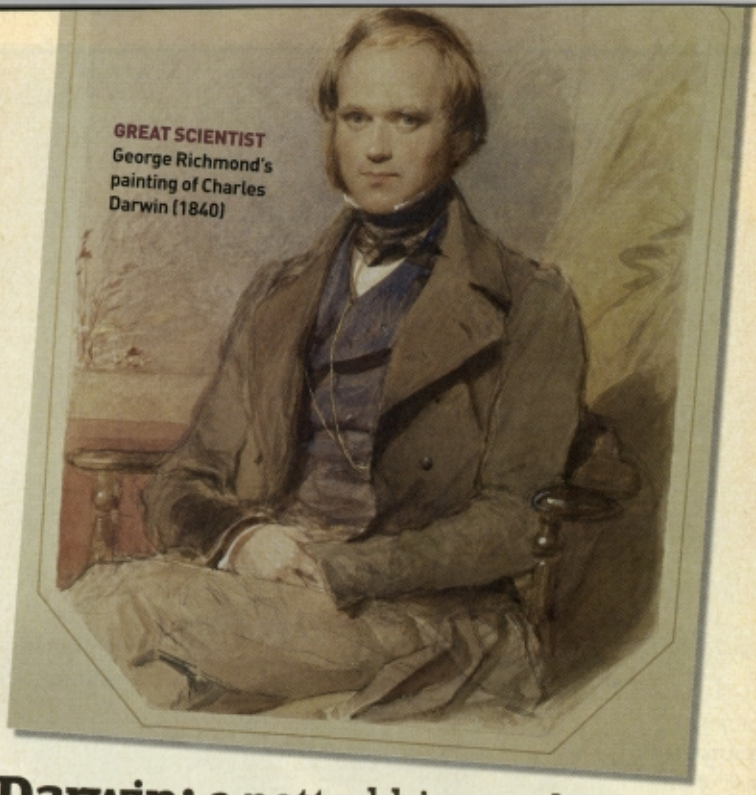
Such was *Constitution* and *Vestiges*' impact that they had societies founded to oppose them and, in at least one case, were publicly burned. No such treatment awaited the *Origin of Species* or its author. Indeed by 1859 such reactions were unthinkably out of date.

Yet it would be a mistake to go so far as to claim that the *Origin of Species* did not create a stir. Countless reviews eventually appeared as well as pamphlets and books in support or opposition. Darwin's name was already well-respected due to his *Journal of Researches* (or *Voyage of the Beagle*, as it is now known), and numerous other major scientific contributions, that his views had to be taken seriously.

So Victorian readers were confronted with one of the leading men of science of the day publishing a work that purported to establish that, contrary to long-held belief, new species were not somehow created in each new geological age to fit the new conditions. Instead, they were the lineal descendants of earlier species. These had gradually changed as the environment changed around them. Thus all living and extinct species were related on a single genealogical family tree – the tree of life.

An engraving of the Blue and Yellow Tanager, taken from *Darwin's Zoology of the Voyage of the HMS Beagle* (Part 3 Birds, 1838)

A good starting point for Darwin's theory was the most familiar example of how animals and plants were known to change: domestication. Darwin explained that because farmers or breeders selected individuals with particular features to breed from they thus increased the proportion of the desired features in their flocks or crops. By repeating the process over many generations, extraordinary modifications had been and were being produced. For example, breeders had made such great alterations to some domestic pigeons that they'd have been described as different species if a naturalist had found them in the wild. Well-marbled beef was bred, sheep with legs too short to hop over fences, and so forth.



GREAT SCIENTIST George Richmond's painting of Charles Darwin (1840)

Darwin: a potted biography

Charles Robert Darwin (1809–1882) was born in Shrewsbury, Shropshire. His father was the financier and physician Robert Darwin. His mother, Susannah Wedgwood, was the daughter of the famous potter. Darwin went to school at Shrewsbury before studying medicine at Edinburgh between 1825–1827. From 1828–1831 Darwin was at Christ's College, Cambridge where he graduated with a BA degree.

Soon after, he was fortunate enough to receive an offer to join the *Beagle*, a surveying ship, as naturalist during a round-the-world expedition. Darwin returned immensely experienced in geology and zoology. He published numerous works based on the *Beagle* expedition – well received in the scientific world back in England – including his famous *Journal of Researches (Voyage of the Beagle)*, and specialist works on the geology and zoology of the voyage.

Based on some of the last of his *Beagle* specimens he began to study barnacles and ended up writing four volumes describing all known species. He then began to write up the theory on which he had been working for 20 years, his theory of evolution by natural selection. He published his great work in 1859. This, together with the *Descent of Man* (1871), established him as one of the foremost naturalists in the world.

Living quietly at his home in Kent, he continued to publish subsidiary evolutionary subjects showing, with great originality, further details and elaborations of how evolution by natural selection works. He died on 19 April 1882 and was buried with great honour in Westminster Abbey.

Darwin obituaries

WHEN DARWIN died in April 1882 he was perhaps the most famous scientist in the world. Within days obituaries began to appear lamenting his death and recounting his remarkable life, career and accomplishments. Reading these today it is striking how consistent they are.

This is surprising coming from so many writers from so many different backgrounds – and before biographies and history books had had the chance to popularise fixed versions of Darwin's life.

What emerged in the obituaries was the almost simultaneous effusion of a generation – a generation that had read and experienced first-hand Darwin's work and impact.

An almost universal attitude was that Darwin had effected a revolution in our understanding of nature unrivalled by any thinker since Newton, or as others put it, unrivalled in any age. The popular science writer Grant Allen wrote in *The Academy*:

> In 1859, the *Origin of Species* at last appeared, under what circumstances all the world knows. It was nothing less than a revolution; it marks the year 1 of a new era, not for science alone, but for every department of human thought – nay, even of human action… the influence of his thought upon the thought of the age has far outweighed any influence ever before exerted by a single man during his own lifetime. He has revolutionised, not biology alone, but all science; not science alone, but all philosophy; not philosophy alone, but human life. Man, his origin and nature, his future hopes and realisable ideals, all seem something different to the present generation from their seeming to the generations that lie behind us in the field of time.

▶ Hundreds of obituaries are available for free on Darwin Online.

Darwin argued that if every life form which had ever lived on Earth reappeared, they could be laid out next to another, parent with offspring – and nowhere would one be able to indicate where one species ceases and another begins (except, of course, for extinctions). Instead one would see an endless chain of individuals in which each offspring differed no more from its progenitors than any child does from its parents.

Yet close study of many thousands of organisms showed that there was a constant abundance of variety or slight differences between all individuals. Darwin already knew this "from long-continued observation of the habits of animals and plants" – and was inspired by the grim population theory of Thomas Malthus. As such, he recognised that the vast majority of living things that were annually produced – from eggs to seeds to pollen – did not survive to reproduce. If they did the entire Earth would be covered by any one species in a few hundred generations. Therefore most individuals were destroyed. Hence the tiny minority that survived to propagate had made it through what was, in effect, a struggle for existence. They did so because they had the right characteristics that enabled specifically them to slip through the gauntlet. Again, if reiterated over the thousands of generations of geological time, limitless change could result.

Darwin's theories inspired the whole gamut of reactions. Among the scientific community they ranged from contemptuous rejection to enthusiastic support. Darwin's wide array of arguments and evidence persuaded many that he had found the hidden bond that naturalists had been seeking which explained how all the different genera and species were related. Suddenly the whole history of life on Earth and the key to its distribution and adaptations had been unlocked.

Other writers felt that Darwin's views were an attack on the role of a Creator in nature and drove a wedge between the moral and spiritual values and aspirations of mankind. Instead of tracing a lineage to the son of God, Darwin's theory suggested man had only beastly origins.

Others, like the Reverend Charles Kingsley, felt differently. He wrote enthusiastically to Darwin about his theory. In fact, such was his admiration that Darwin was granted permission to quote from the letter in the second edition of the *Origin of Species:* "A celebrated author and divine has written to me that 'he has gradually learnt to see that it is just as noble a

conception of the Deity to believe that He created a few original forms capable of self-development into other and needful forms, as to believe that He required a fresh act of creation to supply the voids caused by the action of His laws'."

So, to religious thinkers of Kingsley's ilk, Darwin had uncovered a new law by which God governed the natural world. For such thinkers it was quite reasonable to reconcile Darwin's views with their religion.

Probably the most famous episode in the reception of Darwin's theory is the so-called Huxley/Wilberforce debate. The event took place on 30 June 1860, in the library of the new University Museum in Oxford, during a meeting of the British Association for the Advancement of Science. There are numerous, sometimes contradictory, accounts of what happened. The naturalist Thomas Henry Huxley's own rendition in a letter to Darwin sounds like what one wished one had said during an argument with hindsight. Bishop Samuel Wilberforce, so it is said, asked Huxley if he

Suddenly the whole history of life on Earth and the key to its distribution and adaptations had been unlocked

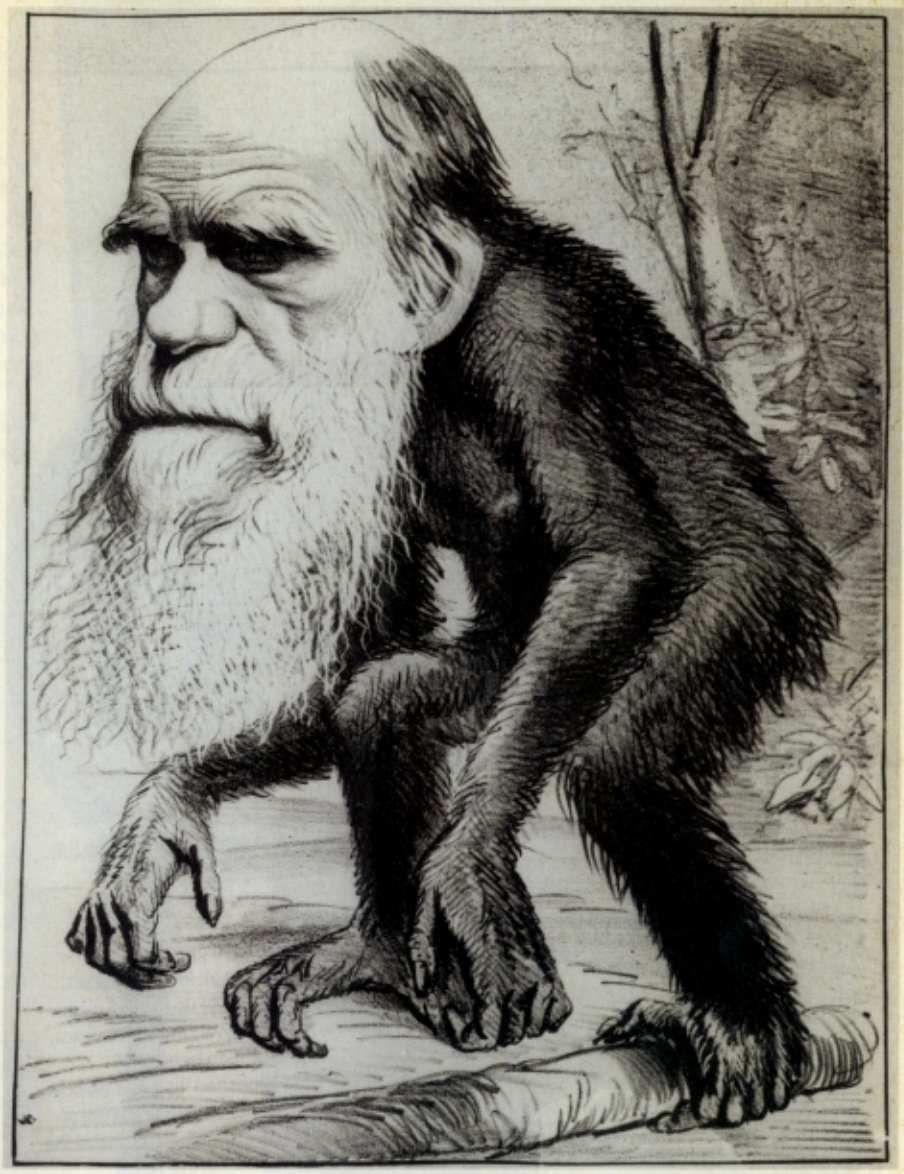
claimed descent from an ape on his grandmother or grandfather's side? Huxley, again according to legend, responded that he would rather be descended from an ape than a man who used his talents to bring ridicule into a serious scientific discussion. We will probably never know exactly what was said during this bout of verbal sparring, and it seems clear that the clash was as much about personalities as science versus religion. What we do know, however, is that Darwin's theory was vigorously debated by the scientific community.

Joining that debate, the phrenologist and botanist HC Watson wrote to Darwin shortly after the publication of the *Origin of Species*: "Your leading idea will assuredly become recognised as an established truth in science, ie 'Natural selection'. It has the characteristics of all great natural truths, clarifying what was obscure, simplifying what was intricate, adding greatly to previous knowledge. You are the greatest revolutionist in natural history of this century, if not of all centuries."

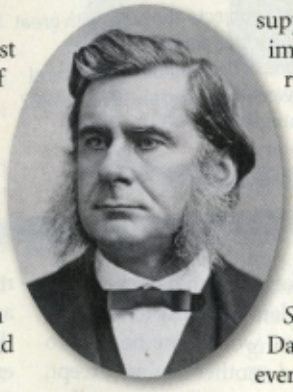
More and more scientists found that Darwin's explanation made sense of their particular areas of expertise. Articles and books soon began to appear praising Darwin's ideas.

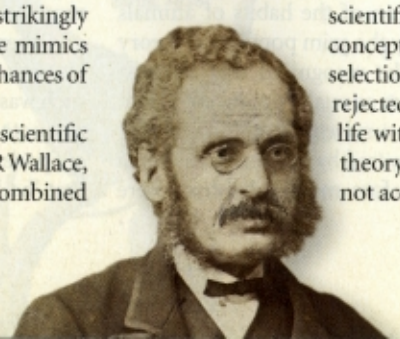
In 1861 Henry Walter Bates, a naturalist just returned from Brazil, showed that natural selection could explain the mystery of mimicry in South American butterflies. Bates had found that many types of brightly-coloured butterflies escaped being eaten because they were very unpalatable to birds. Wherever such species existed, different and rarer butterfly species – even those from different families – had evolved to look strikingly like them. Most significantly, the more one of these mimics resembled one of the inedible species, the greater its chances of being left alone by birds.

There was also a coterie of influential and active scientific supporters of Darwin's views including JD Hooker, AR Wallace, Huxley and, to some extent, Charles Lyell. The combined



MONKEY BUSINESS Satirical magazine *The Hornet* lampoons Darwin as "A Venerable Oran Outang" in 1871





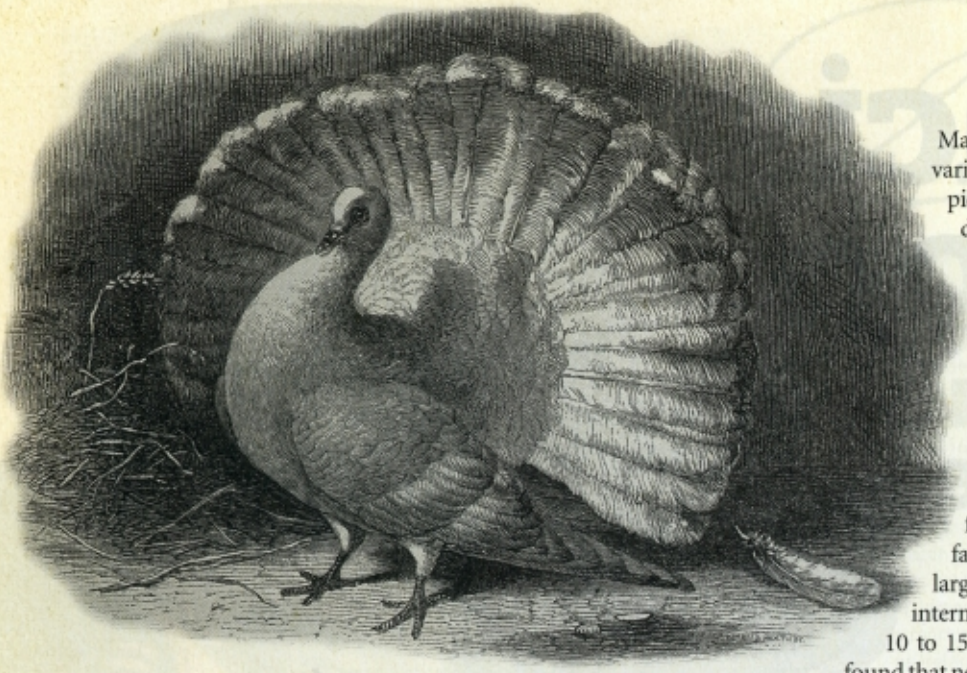
MEN OF SCIENCE Biologist Thomas Henry Huxley (above) and naturalist Henry Walter Bates were impressed by Darwin's theories

support of these and other respected figures, together with the immense argumentative power of Darwin's book itself, resulted in a dramatic overturn of previous views about the permanence of species.

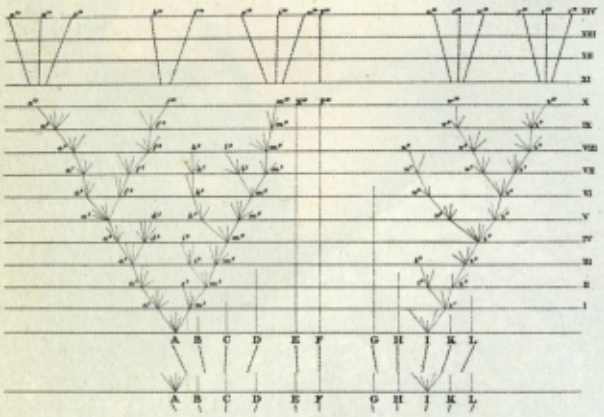
As the years passed and reviews and counter-reviews appeared, the fact of Darwinian evolution, the common descent of species, became increasingly accepted. It made sense of a host of diverse kinds of evidence that were otherwise inexplicable.

Indeed, by around 1869, ten years after the *Origin of Species* first appeared, most scientists had accepted that Darwin was right. Of course things were not the same everywhere. In Germany the theory was accepted rather quickly and with little fuss; in France it was largely ignored for many years. However, by the 1870s Darwin was internationally regarded as a scientific revolutionary who had transformed the study of the natural world.

Yet, surprisingly, the other key Darwinian idea, natural selection, was much less welcome. As scientific and non-scientific readers came increasingly to accept the Darwinian concept of common ancestry for species, the view that natural selection was the primary mechanism was often sidelined or rejected. Huxley welcomed the big picture of the evolution of life with open arms. Yet natural selection – that aspect of the theory that made divine intervention unnecessary – he could not accept.



WELL BRED An illustration of the English fantail taken from Darwin's *The Variation of Animals and Plants Under Domestication* (1868)



Darwin's scheme of the evolution of species, published in 1859, which demonstrated that all species are related on a single family 'tree of life'

Many suggested instead that the variations that natural selection picked out were themselves divinely guided or caused. The bottom line seemed to be – was there a meaning or intention behind how life changed? According to Darwin there were only natural reasons.

All these doubts notwithstanding, from the perspective of those who lived through that time, and even from hindsight today, that fact that Darwin's views were largely accepted throughout the international scientific community in 10 to 15 years is remarkable. Scientists found that new avenues were thrown open to their particular researches. Countless confirmations and refinements to Darwin's views were published. New fossil forms were discovered which filled gaps between already known groups, just as Darwin had predicted.

What is perhaps so extraordinary about Darwin is how far he went beyond his contemporaries. If he had died on the *Beagle* voyage, instead of Darwinism we would probably not have Wallaceism or anyone-else-ism. Instead, as with so many other sciences, over the succeeding decades a community of workers would have come up with the many different aspects that constitute Darwin's theory. Therefore the reason Darwin is special, and the reason he is still remembered as the father of evolutionary biology today, is that he advanced science so far on his own. He not only established evolution by natural selection, long before his contemporaries, but he did so much of the work of substantiating it and of convincing the scientific community of its veracity himself. **BH**

JOURNEYS

BOOKS

Darwin: The Story Of the Man and His Theories of Evolution by John van Wyhe *(Andre Deutsch, 2008)*

To buy this book from **BBC History Bookstore** for **£19.50** (RRP £30) turn to page 72

Darwin's 'Origin Of Species': A Biography by Janet Browne *(Atlantic Books, 2007)*

WEBSITE

Darwin Online – read the real Darwin yourself: *http://darwin-online.org.uk/*

NEXT MONTH

Patricia Fara considers the career and influence of Charles's famous grandfather, Erasmus

Myths and Mr Darwin

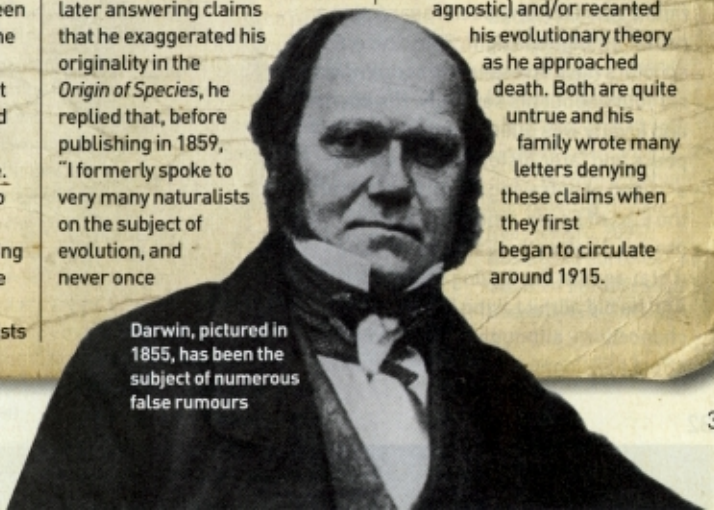
Many scientists of Darwin's day believed in God (imagined in France, c1230) and evolution

THE NUMBER of myths and legends about Charles Darwin and evolution seems to be growing and growing.

One of the most common is that it is impossible to believe in God and evolution at the same time. This myth has perhaps been strengthened all the more by the anti-religious fervour of outspoken atheists. But the fact is, it is possible to believe in God and evolution. This is as true today as it was in Darwin's time. Many people wrote to Darwin to ask him this question and he became rather tired of answering it. Yes, he would reply, of course you can believe in both. And to demonstrate this he supplied lists of prominent scientists who did exactly that.

Another widespread legend is that Darwin was so afraid of what the reactions to his theory would be that he kept it a secret for 20 years. On the contrary, when later answering claims that he exaggerated his originality in the *Origin of Species*, he replied that, before publishing in 1859, "I formerly spoke to very many naturalists on the subject of evolution, and never once met with any sympathetic agreement". This appeared in the sixth and final edition of *Origin of Species* in 1872.

Another myth is that Darwin either converted to Christianity on his deathbed (he was an agnostic) and/or recanted his evolutionary theory as he approached death. Both are quite untrue and his family wrote many letters denying these claims when they first began to circulate around 1915.



Darwin, pictured in 1855, has been the subject of numerous false rumours

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