

Darwinism, religion and the evolution of human thought

Sir, John Sharpe (letter, Feb 10) is right that one of the reasons that Charles Darwin lost his Christian faith and questioned the benevolence of God was his intimate knowledge of cruelty in nature. An example he cited is the ichneumon wasp that lays its eggs inside a living caterpillar, with the result that when the larvae hatch they devour their living host from the inside. Hardly a scheme of things you would expect an all-loving deity to create.

But the fundamental nature of all material reality is freedom. From an initial set of conditions — the big bang — the cosmos evolves freely according to the laws of nature. As we know from our own lives, when we are free to choose we are free to make wrong choices, hence evil in the world. So the question is not why the world is how it is if created by a benevolent deity, but how else it could possibly be if that deity created a free Universe and furthermore what sort of Universe is actually imaginable without such freedom?

JOHN GOLDSMITH
London NW3

Sir, John Sharpe raises "the most intractable issue of all — that an allegedly loving God should have chosen natural selection as his preferred method for creating and developing life on Earth". Presumably there was no choice of methods — it has to be the one necessary to achieve the desired end. If the agents of natural selection include famine, war, plague, pestilence and natural disaster; they also include fertility, co-operation, life-enhancing bacteria, stability and beauty. The totality of suffering and the sum of human goodness both "beggar belief". Amidst it all lie immense possibilities for freedom and growth. Perhaps we can imagine a world without risk and pain but, when all is said and done, we might still opt for this one.

THE REV A. GRAHAM HELLIER
Marden, Herefordshire

Sir, Evolution may sit uncomfortably with traditional concepts of morality but it seems no more rational to reject the belief that they are God-given than to reject the moral principles themselves. Scientific understanding develops as apparent inconsistencies in the natural world

are identified and reconciled through sustained experimentation. It is revealing that people who deride religious beliefs in God rarely seem to address the claims of traditional Christianity that the way that we can relate to God is through the person of Jesus Christ. The imperfect efforts of the Church and of individual Christians to do that may have a long way to evolve but, as G. K. Chesterton commented, the real problem with religion, or certainly with Christianity, is not that it has been tried and found wanting but that it has never properly been tried.

DAVID HARTE
Newcastle upon Tyne

Sir, Darwinism and religion are so different, they shouldn't even be compared. A "loving" God (should such a one exist) would not want conflict in his name — only Man creates that. But a vengeful God, one that encourages us to hate in his name in order to control the species, that's a thought. Maybe mankind should totally dispense with religion in order to evolve further.

ANNE JONES
Pontypridd, South Wales

Sir, Concurring with Cardinal Cormac Murphy-O'Connor (Opinion, Feb 9), if we were solely the product of a biological process, we would lack that critical distance that alone enables us to grasp, question and, indeed, transcend the very process of evolution itself. The phenomenon of Man, with his capacity for transcendence, spirituality and freedom of choice, constitutes very strong "evidence" of the personal God of which the Church speaks.

IAN GORDON
London SW11

Sir, To my simple mind it seems that no inquiring observation of the world could lead to any conclusion other than that there

is something other-worldly that shaped the rules of the Universe; the only thing in doubt and open to debate is: "What is it?"

DENNIS FARRELL
West Cheshunt, Herts

Sir, While the Vatican's forthcoming conference commemorating Darwin's *On the Origin of Species* is most welcome in reconciling science and faith (report, Feb 11), there still remains

an inconsistency in Catholic Church teaching. The 1994 Catholic catechism states that the book of Genesis account of the fall "affirms a primeval event, a deed that took place at the beginning of the history of man". This literalist approach to the origins of humankind is at odds with both modern biblical scholarship,

as alluded to by Cardinal Murphy-O'Connor (Feb 9), and scientific understanding, but is maintained to defend the doctrine of Original Sin, which teaches that all humans are descended from a single human couple. Is it not time for the Church to take the opportunity to reformulate this doctrine to be more coherent with modern understanding — a doctrine largely developed by St Augustine of Hippo, who has a contemporary champion in Pope Benedict XVI?

PAUL PANICCIA
Reading, Berks

Sir, Speculative certainties in *The Times* recently involving inter alia, Darwin, Dawkins and God regarding origins of life on this planet, have been a great help in bolstering my faith although not always my understanding. Nevertheless, as I am approaching 90, it could be the final mystery will soon be resolved. I may then learn why my existence has depended upon something set on fire more than 90 million miles away.

ROBERT VINCENT
Wildhern, Hants

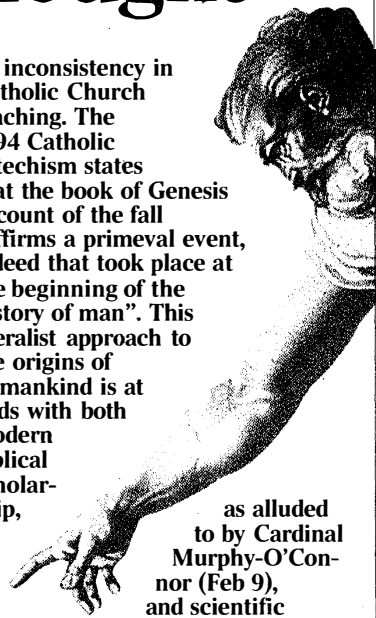
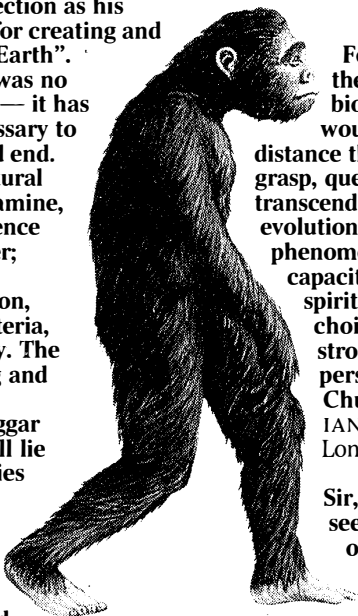
Sir, It is evident that the existence of a Supernatural Being can neither be empirically proved nor disproved. The ultimate and only conclusion must be that it is not irrational either to believe in or deny the existence of a Supernatural Being. Therefore discussions for and against theism will rage on until the end of time.

JOHN WARING
Marske-by-the-Sea, Cleveland

Sir, There may well have been a Creator of the Universe. Whether such a Creator is a benevolent God, Christian, Muslim, Hindu or Buddhist is a different matter.

DAVID STONE
Rye, E Sussex

times2: Charles Darwin special



Darwin understood the need for animal tests

The great naturalist loved all living creatures but defended vivisection. This sparked a debate that still rages today, Colin Blakemore writes

Charles Darwin had a thing about worms. His final book was about their impact on soil, and their contribution to the evolution of other species. Despite its title, *Vegetable Mould* sold even more briskly than *On the Origin of Species* — an indication of the extent to which Victorian society lionised the great man of Nature.

In his autobiography, Darwin records his earliest encounter with animal suffering, and his instinctive abhorrence of it. The victim was an earthworm, the evil done, impalement on a hook for fishing. He describes his satisfaction at discovering that he could kill worms in advance by immersing them in salty water. He never again “spitted a living worm, though at the expense, probably, of some loss of success”. He does not record similar concerns for the fish.

“I was as a boy humane,” he wrote, although he enjoyed shooting as well as fishing. He admits one particular act of cruelty — beating a puppy, “simply for enjoying the sense of power”, when he was a schoolboy. “This act lay heavily on my conscience” he wrote, “as is shown by my remembering the exact spot where the crime was committed.”

On the 200th anniversary of the birth of the most famous naturalist in history everyone wants to claim a piece of Darwin. Not just scientists, but humanists, atheists, philosophers, sociologists and economists vie for a pound of the great man’s flesh.

Above all he is embraced by those who argue for the kinship of humans and other animals, and who demand a revolution in the approach to animal welfare.

True to his theory of the continuity and relatedness of all living things, Darwin was moved by the suffering of animals. Indeed, in what was his most remarkable book, *The Expression of the Emotions in Man and Animals*, he argued that facial and bodily expressions reveal inner feelings — with the implication that animals have fears, pains and pleasures much like our own.

In *The Descent of Man*, he wrote: “The difference in mind between man and the higher animals, great as it is, certainly is one of degree and not of kind. We have seen that the senses and intuitions, the various emotions and faculties, such as love, memory, attractions, curiosity, intuitions, reason etc. of which man boasts, may be found in an incipient, or even sometimes in a well-developed condition in the lower animals.”

So how could Darwin, who championed the living world, who recognised humans as animals, descended from other species, defend the use of animals in research? Should we not be shocked by Darwin’s letter to *The Times* of 1881 defending animal experimentation (reprinted on page 6 of times2)? Could it have been the confused confabulation of an elderly man, only a year from death?

Absolutely not. Darwin was at the height of his intellectual power and social influence. He was well aware of the reputation that he might lose if he were to alienate his audience of admirers — the middle-class intelligentsia who bought his books in astounding numbers.

Darwin was not muddled, senile or seeking favours. He was pursuing the honesty and integrity that were hallmarks of his work. “I have all my life been a strong advocate for humanity to animals and have done what I could in my writings to enforce this duty,” he states at the start of the letter.

Darwin had been involved in the intense debate that followed the introduction of experimental physiology (the study of bodily function) in Britain in the 1870s, with the establishment of professorships of physiology at Cambridge, University College London and Oxford. The publication of a laboratory handbook in 1873 led Queen Victoria to express concern about “encouraging students to experiment on dumb creatures”.

It was true that earlier experiments in France and Germany had been shocking in their apparent disregard for animal suffering. Indeed, the



Huntingdon protest: all parties must move away from entrenched positions

introduction of anaesthetics in the middle of the 19th century influenced the decision to establish experimental physiology in Britain. It was against this background that Darwin wrote his letter, defending the most-difficult-to-defend. And he did it in remarkably unequivocal terms: “I know that physiology cannot possibly progress except by means of experiments on living animals, and I feel the deepest conviction that he who retards the progress of physiology commits a crime against mankind.”

Today we are all familiar with the arguments of those who oppose animal research. And the tactics of some of them. The rise of extremism in the past few years leaves us principally with memories of arson, intimidation, letter bombs and even grave-robbing. Unfortunately, the criminal stupidity of a tiny minority has cast a shadow over the efforts of

Online

Darwin on vivisection — see the video and his original letters

timesonline.co.uk/archiveblog

the majority of welfare groups, such as the RSPCA and the Fund for the Replacement of Animals in Experiments (Frame), which yearn for a time when research on animals might be unnecessary, but work with and within the scientific community to improve the welfare of laboratory animals and the design and conduct of experiments.

Darwin’s own work could be held up as an example of how much can be achieved without resorting to experiments that might cause pain. But he saw that science, just like the complex ecosystems he studied, is a communal process, fuelled by symbiosis, collaboration and interdependence, as much as by competition and predation. Many scientists are fortunate enough not to have to use living animals to advance their area of knowledge, but their work on isolated cells, or computer models, or human patients and volunteers is closely linked to, and dependent on, studies of organ and body systems that are possible only on living animals.

Joseph Lister, whose discovery of antiseptics has undoubtedly saved the lives of millions of people and animals, said it all: “There are people who have nothing against eating a lamb cutlet, people who do not even

stop at shooting a pheasant despite the great risk of its... having to die in severe pain — people who still insist that is monstrous to inject a few microbes under the skin of a guinea pig in order to study their effects. These seem to me singularly inconsistent points of view.”

For me, the correspondence in *The Times* between Darwin, the anti-vivisection campaigner Frances Power Cobbe and others has a special poignancy.

In 1987, without a hint of warning, I found myself the singular focus of criticism from the animal rights movement and then intense harassment for 15 years. It is striking but disheartening to see how similar the arguments are: Darwin’s hyperbolic praise for the contribution of animal experimentation to the advance of medical treatment, on the one hand, Cobbe’s denial of any benefit and her condemnation of, as she saw it, the inevitable cruelty on the other. Such arguments that are still the stock-in-trade of the two powerful animal rights organisations that Cobbe founded, the National Anti-Vivisectionist Society and the British Union for the Abolition of Vivisection.

I hope that this correspondence might have some influence in the present phase of this debate — the discussion in the European Parliament of a draft directive that would, in the opinion of not only the scientific community but even leading welfare organisations, severely impede the progress of medical research, without obvious improvements in animal welfare.

With the possibility that real extremism is being constrained, we have another opportunity in this country to take the lead in the debate to which Darwin contributed. We must move away from the entrenched positions into which passionate commitment has driven all parties. We need a more nuanced debate that goes beyond the total trust of Charles Darwin and the total opposition of Frances Power Cobbe.

Colin Blakemore is Professor of Neuroscience at the universities of Oxford and Warwick and a former chief executive of the Medical Research Council

Animal rights and wrongs, times2

2

THE TIMES

Thursday February 12 2009

Charles Darwin
1809-1882

I'd love to tell Darwin he was right all along

Was the evolution theorist just a beetle-collector who got lucky? No, says Armand Leroi. He was an icon whose discoveries echo through every branch of 21st-century science

It's hard to see Charles Darwin. Not that there's a dearth of stuff around. Turn on the television and you will see David Attenborough, Richard Dawkins or perhaps even me expounding his greatness. You can gaze at his birds in the Natural History Museum in London, as well as his notebooks — or at least facsimiles of them. You can have your fill of Darwin at a hundred lectures given at universities and schools across the country. Send for the poster, buy the mug (I have), browse the supplement; if, by July, you're not fed up with all things Darwinian, then you haven't been paying attention.

Yet for all that, it is hard to see Darwin. For he is no longer a man. He is an idea, a symbol, a battle cry. He is the power of reason against irrationality; progress against reaction; the light of science cutting through the gloom of religion. When he was buried at Westminster Abbey he became an icon of the materialist, secular age. And, like many a saint, he has grown vast in his afterlife. Einstein is as 20th-century as a Warhol print; but Darwin? He is an icon for the 21st.

Every evolutionary biologist worth his salt has fantasised about having Darwin as a colleague. You're at Down House, trying to think thoughts worthy of the hallowed ground upon which you tread, when he shuffles into view: the cloak, the stick, the beard, the hooded brows. What do you say to him? "You have won," would be a good place to start. "In the 21st century, the theory of evolution by natural selection — your theory — reigns as the only rational explanation for organic design. To be sure, others have tried: mutationists, Lamarckians, creative evolutionists, complexity theorists — every generation has produced its pretender. But the crown is still yours and we, your men, are legion."

Darwin's big idea was natural selection, which provided a mechanism for species to change through time, to adapt to their environment. Take two birds, one with a long

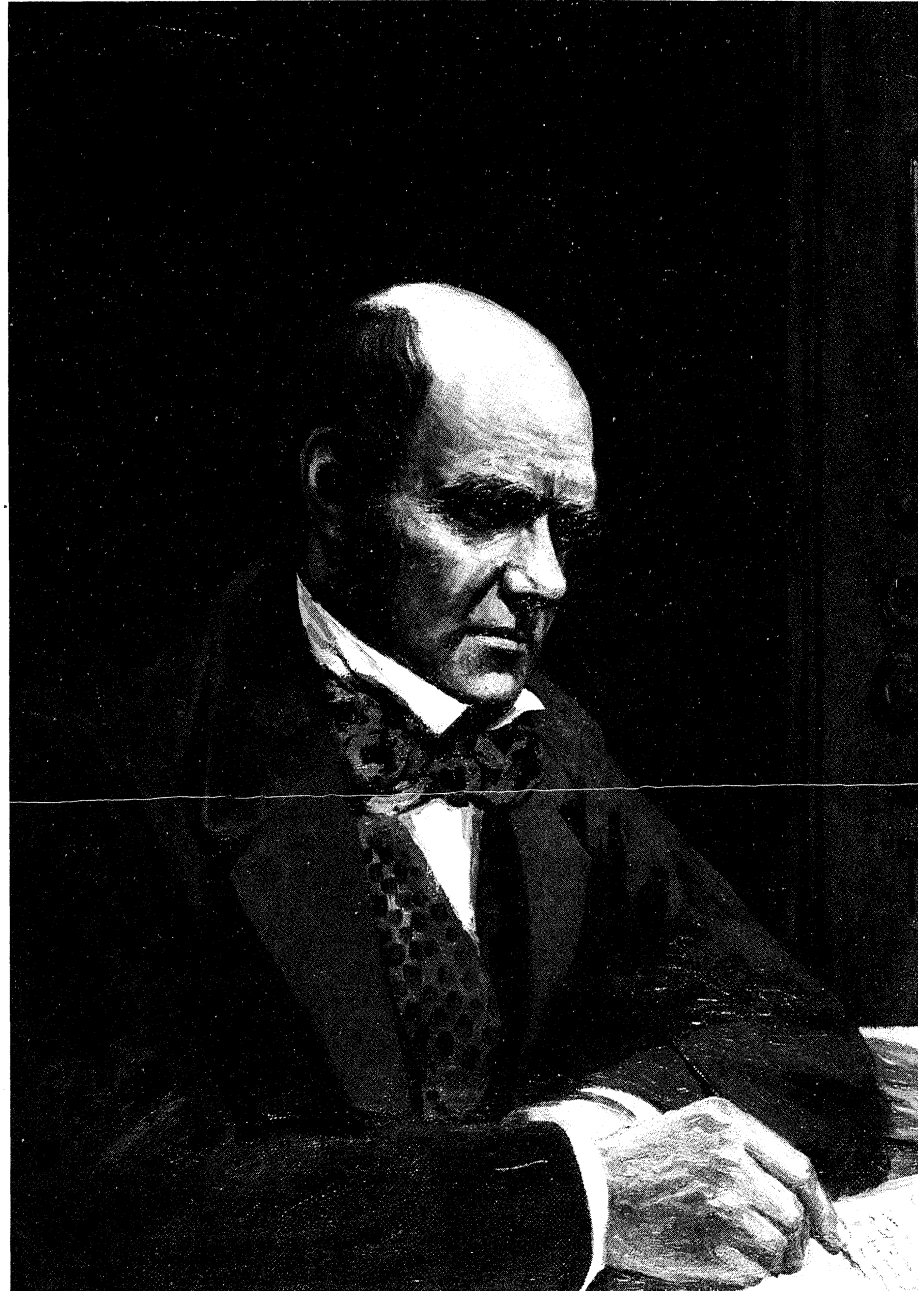
beak and one with a short beak. Assume that the difference is inherited. If a long beak assists in the finding of food, those with long beaks are more likely to reproduce, and their long-beaked progeny to reproduce. Short-beaked competitors will starve and eventually die out. Particular species colonise particular environmental niches; in this way, Nature selects the winners and losers in the game of life.

When we look at much of science today, we find that Darwin got there first. It's all there in embryonic form in *On the Origin of Species*. Biogeography, palaeontology, genetics, evolutionary-developmental biology, ecology, sociobiology: every chapter, occasionally every page, is now a discipline in its own right. Darwin would marvel, though, at how mathematical the theory of evolution has become — hestruggled with maths at Cambridge. The geologist in him would grasp instantly how plate tectonics tumbles the continents across the face of the globe, and how this explains why New Zealand has a frog. The palaeontologist would marvel at the exquisite microscopic fossils that Chinese researchers have been harvesting from Guizhou. They prove what he always supposed, that animals must have swarmed in the pre-Cambrian seas, long before they were preserved in English rocks. The proto-bird *Archaeopteryx* he knew about. But he didn't know about the fossilised whales-with-legs that now link humpbacks to hippopotamuses. And he certainly didn't know about *Sahelanthropus*, *Australopithecus*, *Homo habilis*, *erectus*, *heidelbergensis* — the whole panoply of hominid fossils that show, in irrefutable detail, the descent of Man from apes. He might, though, retort: "Found them in Africa, you say? Just where I said they would be."

Darwin didn't get everything right: he didn't guess that genes are the units of inheritance. But he would grasp instantly how DNA can be used to unravel the history of life. He would understand how his 1837 sketch of a tree (with that infinitely moving "I think" scrawled next to it), which in his hands was a mere metaphor to explain the descent of species from a common ancestor, has become, in ours, a reality. It is a vast map of the organic world, in which every living thing has its place, providing the narrative spine of the greatest story every told: the story of life itself.

Perhaps my deepest pleasure would come from telling him how natural selection, far from being the weak and invisible force that he thought it was, is often strong and manifest in the natural world. Because he is, above all, a naturalist, I would tell him about just one wonderful, new part of the living world: the cichlid fishes of Lake Malawi. Four million years ago a fish entered the lake that Livingstone called Nyassa,

COVER: JOHN ENOCH. BELOW: ART ARCHIVE



A portrait of Darwin in 1858, at work in his study at Down House, Kent



The history

1809

Darwin born in Shropshire into Wedgwood-Darwin dynasty. Famous grandfathers — Erasmus Darwin and Josiah Wedgwood

1825

Studies medicine at Edinburgh University but hates surgery

1826

Joins nature society at Edinburgh University and is taught taxidermy by a freed black slave, John Edmonstone

1827

Quits medicine

1828

Moves to Cambridge to study for the Church



1831

Joins Beagle voyage, during which he conceives the idea of natural selection by looking at finches

1836

Returns home

1837

Debuts as a naturalist, making his first presentation to the Royal Geological Society. Begins to doubt the creation of species by God

1839

Marries Emma Wedgwood, a first cousin and devout Christian

1840

Ill-health sets in, turning Darwin into a recluse

1842

Moves to Down House, Kent, paying £2,200 for it, and makes first private notes on transmutation of species

1858

Alfred Russel Wallace writes from Malay Archipelago to say that he has discovered natural selection. Panicked, Darwin co-publishes, with Wallace, the first account of natural selection

1859

On the Origin of Species published, in which the word "evolution" does not appear

Darwin's scientific legacy

when it first formed — and now there are perhaps 600 species of cichlids, all descended from that one original fish. Some are as large and as fierce as a pike and have gun-metal scales; others eat algae and are as brilliant as jewels. They build castles in the sand, flash their fins at each other, and brood their young in their mouths. They are, Mr Darwin, like your finches and tortoises: an evolutionary experiment, but on a far grander scale. They are living, swimming, copulating proof of the power of natural selection to transform living things in ways that we can hardly imagine.

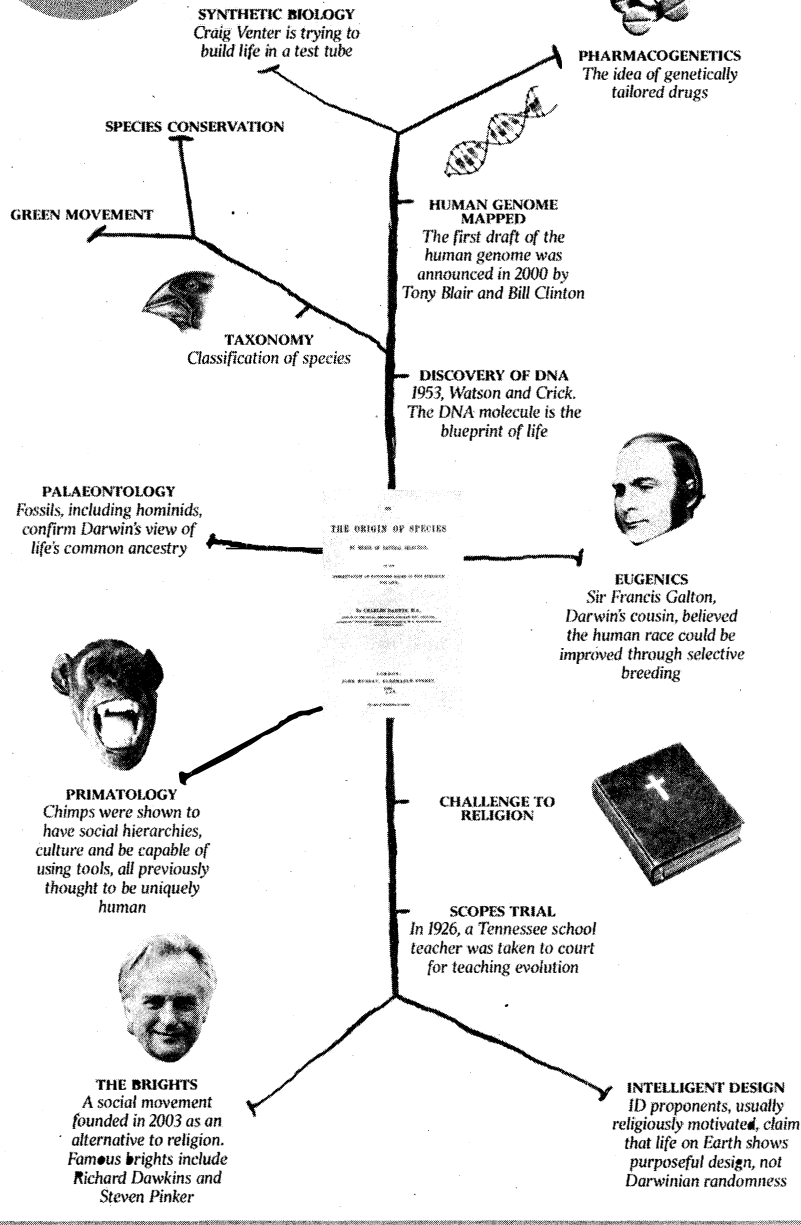
How he would rejoice. But I would also have to tell him that in America we are still fighting the Church. He would see "intelligent design" for what it is — old-fashioned natural theology by another name. He would, however, delight in the belligerence of Richard Dawkins.

People have said that if Darwin had not hit upon natural selection, someone else would have. Leaving aside the fact that Darwin co-published his idea with Alfred Russel Wallace, was Darwin simply a beetle-collector who got lucky? No. I know this because I have walked in Darwin's footsteps. Everywhere he went, he didn't just look. He theorised. Every fervent note that he scribbled brought him closer to the theory of evolution.

You can follow in his footsteps, too. Book for Buenos Aires and pack only boots and *The Voyage of the Beagle*. Stand above the cliffs of Bahia Blanca, where he dug a giant ground sloth (*Myodon darwini*) from the clay. Strike south to Port Desire, find some gauchos and chase the Darwin's rheas across the pampas — you are in Patagonia. Turn west to the high cordilleras, traverse their passes and find the beds of fossil seashells that he discovered on their summits. Follow their rivers back down again — the roar of their pebbles is just as he describes. End in Rio and seek out the remains of the *Mata Atlântica*, the Brazilian coastal forest that so overwhelmed him when he first arrived in the New World that he compared it to a cathedral.

If you look at it through his eyes, you will view the world anew. You will no longer see just rocks and creatures and people; you will see vast contesting forces and infinities of time and the way our world is shaped by them. But, of course, nobody except Darwin could see the world through his eyes. He was not just a scientist, but an incomparably great one. And that is why, today, we are celebrating what would have been his 200th birthday.

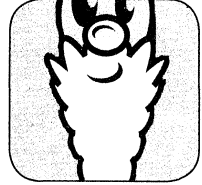
Armand Leroi is Professor of Evolutionary Developmental Biology at Imperial College London and author of *Mutants*. He is also presenter of Darwin's Lost Voyage, on National Geographic



NATHALIE LEES

Darwin: the tweet

Darwin clearly wasn't thinking of future technologies when he coined the original title of his opus. Users of Twitter, who entertain each other by swapping messages of 140 characters or less, would recognise that you don't give yourself much room for manoeuvre when your book title alone stretches to 111 characters: *On the Origin of Species by means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*. By its sixth print run, Darwin had managed to pare it down to the snappier *The Origin of Species*. Given another 172 years, he could probably have distilled its contents down to one succinct tweet:

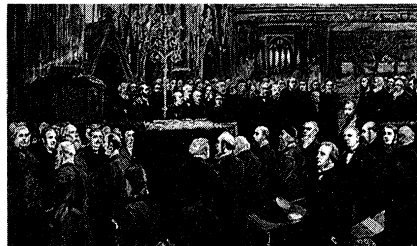


DarwinC Great creatures adapt. Not so great 1s die. Check out those finches beaks. Survival of the fittest innit.

10:31 AM Oct 27th, 1837 from TweetDeck



- 1863 The fossil of a lizard-bird is discovered, which strengthens Darwin's theory of transmutation of species
- 1866 Phrase "survival of the fittest" coined by Herbert Spencer, a contemporary of Darwin
- 1871 *The Descent of Man, and Selection in Relation to Sex* published by Darwin



- 1872 *The Expression of the Emotions in Man and Animals* published by Darwin
- 1882 Darwin dies; state funeral. Buried in Westminster Abbey. Wallace is a pallbearer

- 1911 Australian settlement of Palmerston officially renamed Darwin
- 1964 Darwin College founded at Cambridge University
- 2000 Darwin replaces Dickens on the £10 note (Bank of England claims his beard is hard to forge)



- 2009 200th anniversary of Darwin's birth and 150th anniversary of publication of *On the Origin of Species*. The book is reissued, with a Damien Hirst cover, and a commemorative £2 coin is issued featuring Darwin face-to-face with an ape

The 'coffin brig' that sailed the ultimate voyage

A ship that was thought likely to sink became the craft that took Darwin around the world, says Peter Davies

No one who witnessed the launch of HMS Beagle at Woolwich naval dockyard on the Thames on May 11, 1820, could possibly have imagined that this unremarkable, not to say dowdy, craft was destined to sail into the pages of history on one of the most famous voyages of scientific discovery ever undertaken.

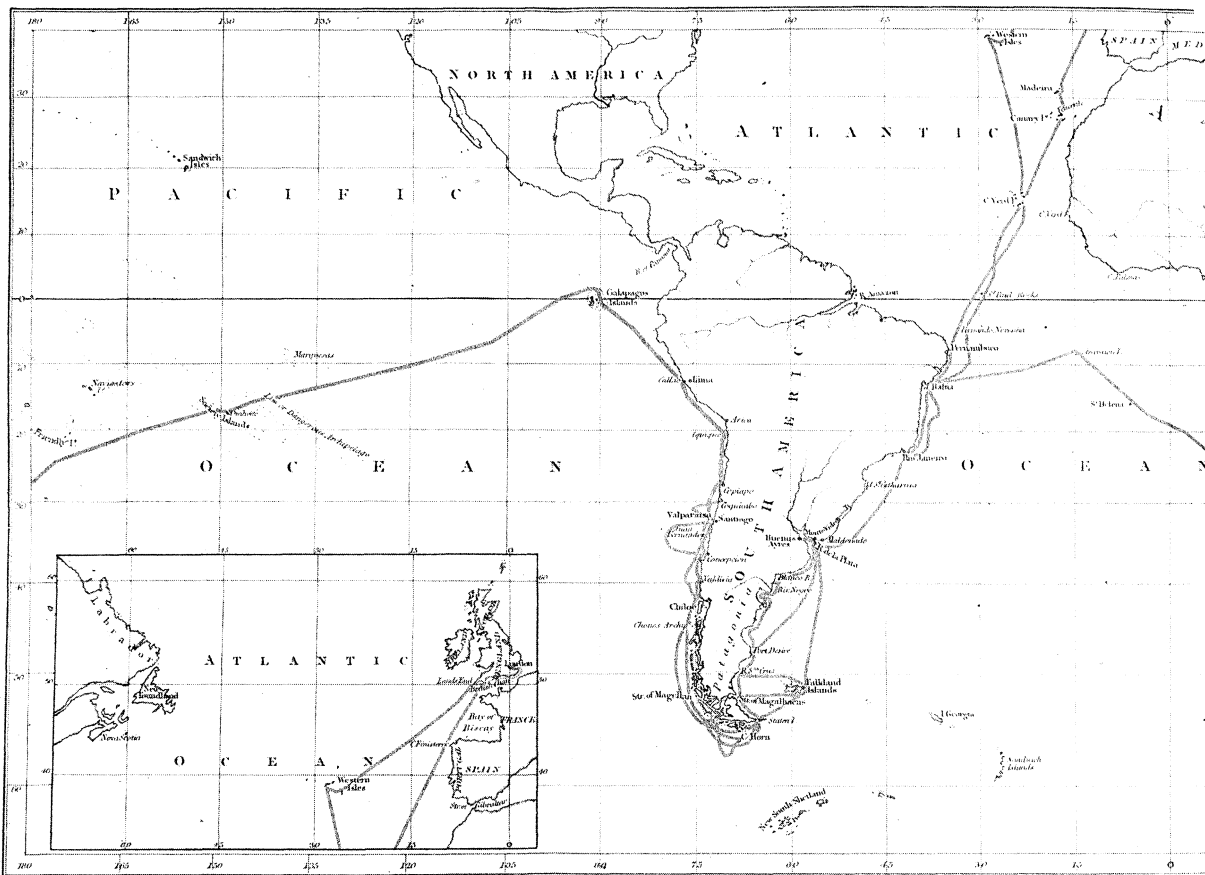
Ships like the Beagle, ten-gun brigs (two-masted, square-rigged vessels) displacing barely 250 tonnes — a tenth of the size of Nelson's Victory — were regarded as one of the lowest forms of naval life. Their nickname "coffin brigs" expressed the generally held belief in the Navy that once out at sea in any kind of heavy weather, they shipped unacceptable amounts of water and were highly likely to sink.

Planned as a class of ship for inshore blockading operations as the Napoleonic wars drew to a close, they were produced in droves, but after 1815 no immediate use could be found for them. Beagle never saw action. Instead she spent the first few years of her naval life in reserve, moored afloat.

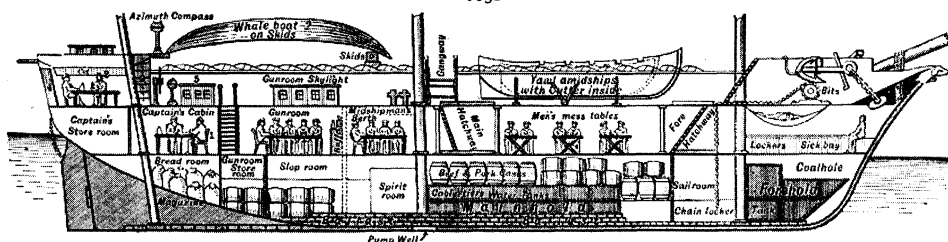
Things looked up for the Beagle in 1825. She was given a third mast, which improved her sea-keeping qualities, and adapted as a survey ship. Even so, her first voyage from Plymouth, beginning in May 1826, to conduct a hydrographic survey of the coasts of Patagonia and Tierra del Fuego under the command of Captain Pringle Stokes, was far from auspicious.

Stokes became so depressed by the problems of surveying in the dreary, dangerous waters around Tierra del Fuego that he locked himself in his cabin for a fortnight before shooting himself and eventually dying, after lingering for 12 days, on August 14, 1828. That might well have been the end of the Beagle's career of exploration, given the unsuitable conditions — cramped, ill-lit and noisome — below her decks.

There was to be a second chance, this time under the command of Robert Fitzroy, a surveyor and meteorologist whose brief was to take the Beagle on what

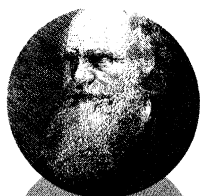
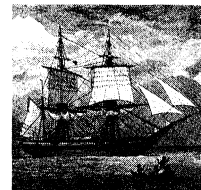


H.M.S. BEAGLE
MIDDLE SECTION FORE AND AFT
1832

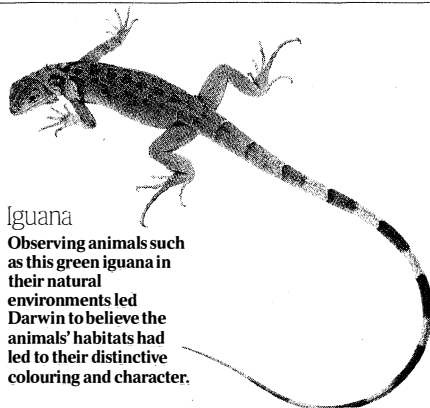


1. Mr. Darwin's Seat in Captain's Cabin
2. Mr. Darwin's Seat in Poop Cabin with Cot slung behind him
3. Mr. Darwin's Chest of Drawers
4. Rootcase
5. Captain's Skylight

Read the letter Robert Fitzroy sent to The Times timesonline.co.uk/archive



The Darwin discoveries

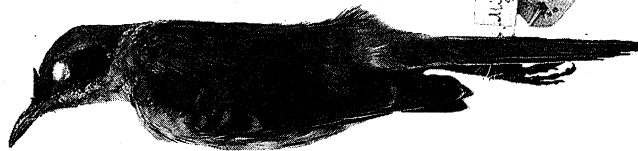


Iguana
Observing animals such as this green iguana in their natural environments led Darwin to believe the animals' habitats had led to their distinctive colouring and character.

Mockingbirds

In the Galapagos Darwin collected a mockingbird on San Cristobal Island. On the next island, Floreana, he found another, and saw differences between the

birds. Examining the variety between the birds on the voyage home, Darwin questioned "the stability of species". This eventually led him to the idea of evolution, though he did not use that word until many years later.

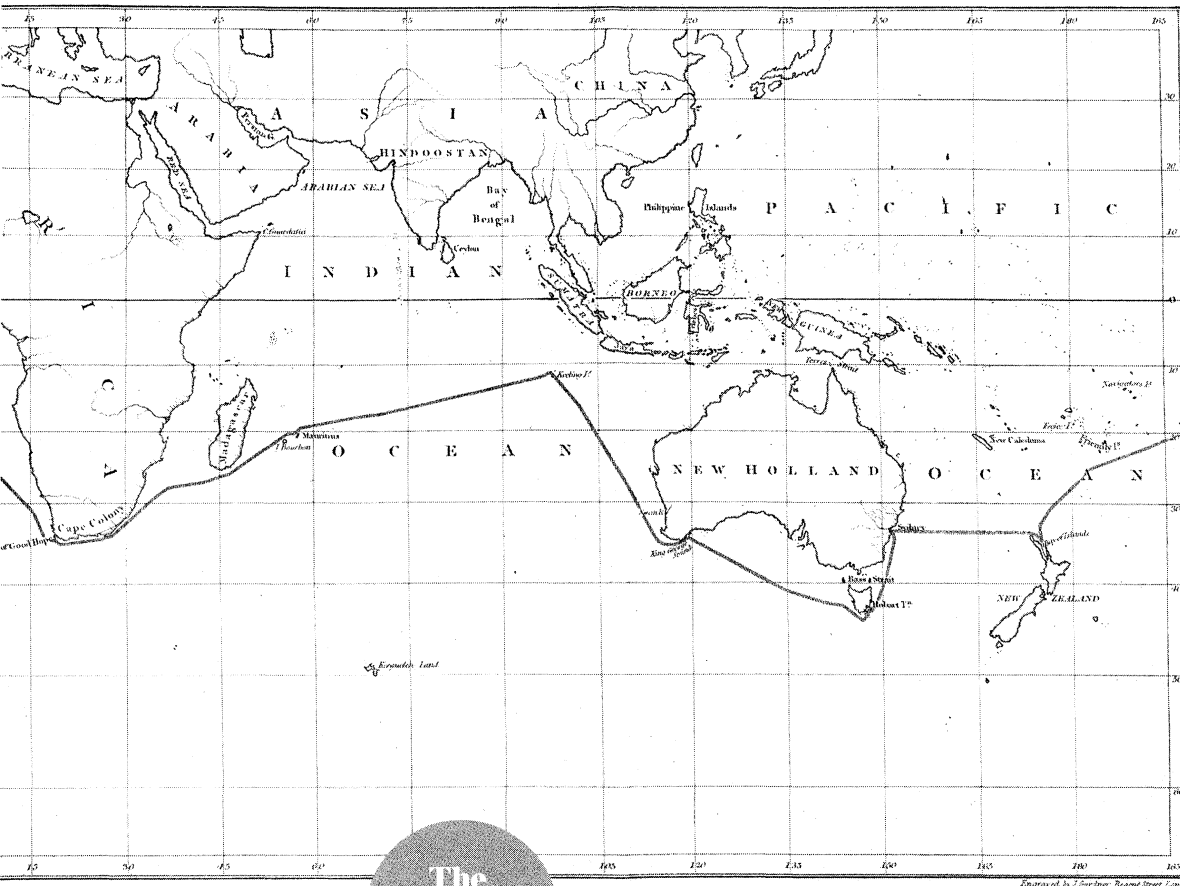


Beetles

In his biography Darwin recalls finding two rare beetles on a tree. He seized one in each hand but then saw a third, new kind. When he popped one of them between his lips to catch the third, it ejected an acrid fluid, burning his tongue and causing him to spit out the beetle, losing it as well as the third one.

of discovery

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The intrepid explorer

Darwin left behind quite a trail during his five-year circumnavigation of the globe on the HMS Beagle between 1831 and 1836. In 1833, the ship's Captain Fitzroy christened an expanse of sea by the Tierra del Fuego archipelago Darwin Sound. He also has four mountains and a city in Australia named after him.

became a five-year round-the-world voyage of hydrographic survey. An understanding man who was aware of a history of mental illness in his own family, Fitzroy knew only too well the dangers of succumbing to depression for a captain isolated in sole command on a long voyage.

This awareness was to be the making of Charles Darwin, at that time a young naturalist of no great reputation. He was recommended to Fitzroy as a self-funded "gentleman companion" whose pleasing chatter at the captain's table might perhaps help to alleviate the rigours of a second voyage to the Pacific to complete the aborted South American survey.

It was a most unlikely conjunction of temperaments — and experience. Although a man who loved the outdoors, at 22 Darwin's sole experience of seagoing was a

single cross-Channel passage. As he confided to his diary in November 31, 1831: "My notions of the inside of a ship were about as indefinite as those of some men on the inside of a man, viz. a large cavity containing air, water & food mingled in hopeless confusion."

More fundamentally, Fitzroy was an austere religious conservative, and as staunch a Tory by political conviction as Darwin was a thorough-going Whig and unrelenting opponent of slavery, which he regarded as a "scandal to Christian nations". Remarkably, none of these differences seemed to matter to Fitzroy. His guest's five path-breaking years that were to shake the religious assurance of 19th-century England to its foundations with the publication in 1859 of *On the Origin of Species*, were, to the end, to leave his own religious

and moral convictions unmoved.

The key to the coexistence of two so radically dissimilar men lay in what seems to have been a genuine perception of each other's qualities. Darwin admired Fitzroy's own scientific qualifications, his endurance and his sheer capacity for getting things accomplished. "If he does not kill himself, he will, during this voyage, do a wonderful quality of work." For his part, *Beagle's* skipper continued to find Darwin "a very pleasant mess-mate" — which had, after all, been the object of the exercise.

The *Beagle* finally got away from Plymouth at the end of December 1831 after being several times forced back by adverse winds. By this time, after a total refit, she was a very different vessel from the lowly rated coffin brig of 1820. "No vessel has been fitted out so expensively,

and with so much care," Darwin observed.

Splendid interior fittings were one thing; *Beagle's* sailing qualities were soon to be put to the test. With her extra weight from a sheath of two-inch plank, and a raised upper deck, Fitzroy at first had some difficulty in getting her into sailing trim. It was a problem he worked on relentlessly, redistributing weight, including her guns, both above and below decks as well as altering her rigging. At last he was satisfied. By the end of December 1832 the ship was again entering the Straits of Magellan.

Darwin had by that time long got over the seasickness that made his early days on board such wretched ones for him; paradoxically it was Fitzroy, strong-minded as he was, who was now in the worse mental shape. By this time the gentleman companion of the outset of the voyage was transforming himself into something quite different. Not content merely with collecting specimens, he was making deductions about what he found that were to alter man's perception of the evolution of animate things.

Over the five years of the voyage, Darwin went ashore at every opportunity while the *Beagle* continued her survey work at sea. On her first stop, at St Jago in the Cape Verde Islands, he had discovered fossil shells high in volcanic cliffs; in Patagonia he was astonished to discover fossilised large mammals; to these, as the passage up the coast and islands of South America continued, were added reptiles and fossils of primitive trees. The Galápagos Islands gave his theories of evolution a new and potent impetus that would challenge mankind's view of the Creation. When organising his notes as the *Beagle* sailed home Darwin first used the term "origin of species". By the time the *Beagle* returned to Plymouth on October 2, 1836, her captain's "gentleman-companion" of five years before was already a celebrity in scientific circles.

The differences between Darwin and Fitzroy became clearer in the years after the voyage. When *On the Origin of Species* was published, Fitzroy could not contain his opposition to Darwin's theory and wrote a letter to *The Times*, under a pseudonym, claiming that Darwin was contradicting the Book of Genesis.

Then, succumbing to the family tendency to mental illness that had, in 1822, caused his uncle, Viscount Castlereagh, to commit suicide, he took his own life by slashing his throat with a razor in 1865. He was 59.

Toxodon

Darwin found the fossil skull of the *Toxodon*, a large, extinct hoofed mammal, in a stream near the Rio Negro. He sent it to Richard Owen, founder of the Natural History Museum in London, for him to identify. The skull is one of 15,000 Darwin specimens still held at the museum today.



Armadillo

Among Darwin's most dramatic finds was the fossil of a glyptodont, an immense shelled animal. He noticed that its giant shell was like those he had seen on armadillos scurrying about in Argentina, and wondered why one species had died out, only to be replaced by a similar one. *Chloe Lambert*



© NATURAL HISTORY MUSEUM

Animal rights — and wrongs

Letters written to The Times show how Darwin ignited the vivisection debate and enraged a formidable foe.
By Ben Macintyre

Charles Darwin ignited a firestorm. He was accused of blasphemy and godlessness, while his supporters insisted that he was merely furthering the noble cause of science. There were charges and counter-charges of sin, crime, ignorance and cruelty. The cause of this spectacular fight was not the theory of evolution, but vivisection — scientific experiments with live animals.

The year was 1881, 22 years after Darwin had published *On the Origin of Species*. And the fuse was lit not by a scientific treatise, but by a letter to *The Times*. The resulting battle pitted Darwin, the greatest living scientist, against Frances Power Cobbe, a pioneering feminist, social reformer, religious moralist and campaigner for animal rights. Science has moved on in immeasurable ways since Victorian times, but today's debate over vivisection evolved directly from the epic confrontation between Darwin and Cobbe that erupted 128 years ago.

On April 18, 1881, a letter appeared in *The Times* under the headline "Mr Darwin on Vivisection". It was an emphatic, whole-hearted statement of support for the practice of experimenting on animals, but it went farther, accusing anti-vivisectionists of crimes against science. "I know that physiology cannot possibly progress except by means of experiments on living animals," Darwin wrote. "And I feel the deepest conviction that he who retards the progress of physiology commits a crime against mankind."

Darwin insisted that he had always been "a strong advocate for humanity to animals", but declared that experimenters on them had already brought "incalculable benefits" to Man and "the lower animals". "Let it be remembered how many lives and what fearful amount of suffering have been saved by the knowledge gained of parasitic worms through ... experiments on living animals," he wrote. Scientists such as Louis Pasteur, he predicted, who had experimented with animals, would one day be recognised as "benefactors of mankind".

The vivisection debate had been brewing for some time, in the wake of Darwin's evolutionary theory. Anti-vivisectionists argued that if Man and animals were so closely related, then by what right did man experiment on his close evolutionary relatives? Supporters of vivisection countered that the very evolutionary proximity of Man to animals meant that animal experimentation offered vast scientific benefits.

Darwin's letter prompted an immediate and furious response from Cobbe, and he could not have provoked a more formidable opponent. Although almost forgotten today, Cobbe was an immense figure in Victorian Britain, both physically and intellectually, and the leading pioneer of animals' right activism in Britain.

Her letter to *The Times* appeared the day after Darwin's, and accused the great scientist of condoning the "heinous sin ... of the deliberate torture of God's harmless creatures". She paid elaborate false homage to the "great philosopher" before attacking him. "I am, course, not competent to argue with so great an authority," she wrote, before going on to do exactly that, accusing Darwin of "remarkable errors". Cruelty to animals, in the name of science was immoral, she insisted, eroding Man's natural sympathy and compassion: "What shall it profit a man if he gain a whole world of knowledge and lose his own heart and his own conscience?" Like latter-day anti-vivisectionists, she also challenged whether vivisection really produced the medical breakthroughs its practitioners claimed.

Cobbe, born in Dublin in 1822, was a powerful personality and radical thinker, in many ways in advance of her time. A lesbian who lived in a long-term relationship with the artist, Mary Lloyd, she was the first major thinker to link feminism with animal rights, pointing out that women and animals suffered at the hands of men in general, and the male-dominated medical profession in particular.

As founder of the Society for the Protection of Animals Liable to Vivisection (SPALV) and the British Union for the Abolition of Vivisection (BUAV), Cobbe's writings on animal experiments touched a chord in Victorian Britain, but enraged the scientific community.

"If there be one moral offence which more than another seems directly an offence against God, it is this wanton infliction of pain upon his creatures," she wrote. "He places them absolutely in our charge. If we break this trust, and torture them, what is our posture towards Him? Surely as sins of the flesh sink man below humanity, so sins of cruelty throw him into the very converse and antagonism of Deity; he becomes not a mere brute, but a fiend."

The battle was now joined in earnest.

MR. DARWIN ON VIVISECTION.

The following letter has been addressed by Mr. Charles Darwin to Professor Holmgren, of Upsala, in answer to a request for an expression of his opinion on the question of the right to make experiments on living animals for scientific purposes—a question which is now being much discussed in Sweden:—

"Down, Beckenham, April 14, 1881.

"Dear Sir,—In answer to your courteous letter of April 7 I have no objection to express my opinion with respect to the right of experimenting on living animals. I use this latter expression as more correct and comprehensive than that of vivisection. You are at liberty to make any use of this letter which you may think fit, but if published I should wish the whole to appear. I have all my life been a strong advocate for humanity to animals, and have done what I could in my writings to enforce this duty. Several years ago, when the agitation against physiologists commenced in England, it was asserted that inhumanity was here practised and useless suffering caused to animals; and I was led to think that it might be advisable to have an Act of Parliament on the subject. I then took an active part in trying to get a Bill passed, such as would have removed all just cause of complaint, and at the same time have left physiologists free to pursue their researches—a Bill very different from the Act which has since been passed. It is right to add that the investigation of the matter by a Royal Commission proved that the accusations made against our English physiologists were false. From all that I have heard, however, I fear that in some parts of Europe little regard is paid to the sufferings of animals, and if this be the case I should be glad to hear of legislation

Darwin, bristling at the suggestion that he had "misinformed" readers of *The Times*, wrote another letter, quoting from the Royal Commission, which, he said, had exonerated British scientists from charges of "wanton cruelty" to animals.

Cobbe immediately fired back with another letter. "The obvious truth ... is that vivisection always has been and must be the same thing all the world over; and that it is impossible for man to devote his life to such a practice without experiencing a growing ardour for scientific curiosity and corresponding recklessness and callousness respecting the suffering which the gratification of that curiosity may involve."

Others waded into the letters debate. George Romanes, the distinguished evolutionary biologist, accused anti-vivisectionists of "fevered sentimentality" and added: "Such persons usually entertain the most absurd ideas on the amount of painful vivisection ... which goes on in our physiological laboratories." Richard Hutton, of Staines, took issue with him, condemning the "premeditated infliction of suffering, often exquisite, on our fellow creatures".

“It is remarkable how familiar the arguments are today”

”



Your obedient servant,
Charles Darwin:
read the original correspondence in full at timesonline.co.uk/archive

The argument grew so acrimonious that *The Times* felt obliged to comment on the matter, noting that Darwin and his opponents had "rekindled a controversy which is always sure to be intemperate". The newspaper's leader writer came down, with reservations, on the side of Darwin and the vivisectionists, arguing that, although inflicting pain on animals was shocking, individual scientists should be left to weigh up the importance of research against the suffering involved.

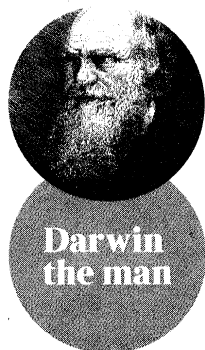
"On the heart and conscience of physiologists rests the responsibility of deciding when and how the importance of the problem they are solving excuses the infliction of suffering upon beings without choice in the matter," this paper concluded.

The exchange of letters did not settle the matter, but it crystallised a debate that had been steadily growing in intensity as Victorian Britain sought to reconcile the advance of science with religious belief. But perhaps the most remarkable aspect of the Darwin-Cobbe confrontation is how familiar their arguments seem today. Then, as now, at its simplest the dispute represented a collision between science and faith. Indeed, the rediscovery of the long-forgotten letters in the *Times* Archive has added fresh fuel to the modern debate on animal testing.

Supporters of vivisection this week hailed the letters as proof that the great theorist of evolution regarded experimenting on animals as a sad necessity. "Darwin is absolutely unequivocal, almost stridently so," Colin Blakemore, Professor of Neuroscience at the University of Oxford and a prominent defender of animal research, said. "Darwin never did an animal experiment in his life, which makes it all the more remarkable that he saw vivisection as necessary for the advancement of science. The imprimatur of such a great scientist is wonderful."

Opponents of vivisection, however, say that Darwin's attitude to experiments, and animal welfare in general, was more complex, and that had he been alive today he may instead have opposed experiments on living animals. According to Wendy Higgins, from the Dr Hadwen Trust, a medical research charity funding exclusively non-animal research, science has moved on immeasurably from Darwin's day, undermining the case for vivisection.

"He shouldn't be pigeonholed," she said. "Darwin couldn't have foreseen the amazing technological advances in science that have resulted in more advanced, human-



The distracted schoolboy
Darwin's parents and teachers held out little hope for him. His school reports said that he wasn't interested in studying, only in shooting, riding and beetle-collecting. "You care for nothing but shooting, dogs and rat-catching," his father once told him, "and you will be a disgrace to yourself and all your family."

The owlsh undergrad
While at Cambridge University, Darwin joined the Gourmet Club, which met once a week to eat animals not found on restaurant menus. His passion for adventurous meats was pushed to the limit, however, when he tried eating an old brown owl, which he found "indescribable".

The pragmatic fiancé
Before making the decision to marry his first cousin, Emma Wedgwood, Darwin wrote out a list of matrimonial pros and cons. Underpropos, he listed "... object to be beloved & played with ... better than a dog, anyhow", and under cons "not forced to visit relatives". "Marry, marry, marry Q.E.D.," he concluded.



The prolific father
Darwin had ten children with Emma in the space of 17 years. His youngest, Charles, died as a baby; the others suffered from a range of serious ailments, prompting Darwin to write to a friend: "We are a wretched family and ought to be exterminated." His children's problems made him think seriously about the dangers of inbreeding.

The ardent activist
Darwin was a passionate abolitionist, and in their new book *Darwin's Sacred Cause* the science historians Adrian Desmond and James Moore argue that the driving force behind his work on evolution was to prove "common descent" and consequently that all men were equal.
Hannah Fletcher

Darwin in cartoons

relevant, non-animal replacements for animal research like powerful brain scanners, 3-D models of disease, computer imaging, mathematical modelling of pharmaceuticals and so on.

"Darwin detested animal cruelty, and in the modern age he would have been completely against animal experiments."

"Only if he was duped," responds Professor Blakemore. "Just read what he says. The letters say it all."

Supporters of vivisection today also reject the claim that there are other ways to achieve the same scientific results. "It is an outrage to say alternatives exist," said Professor Blakemore. "The law says that if alternatives exist then it is illegal to use animals. I have never met a researcher who would not be delighted to give up research on animals if there was another way to get results." He said that he had been aware of Darwin's views on vivisection, but had not read the correspondence in *The Times* in full before. "It's unfortunate in a way that it's been lost until now, because it is very significant for the current debate."

Each side has accused the other of failing to move on in its arguments since 1881. Supporters of vivisection still insist, as Darwin did, that animal research is key to scientific progress, while opponents argue that animal experimentation is neither necessary nor ethical. "If you defend animal experiments," Higgins says, "the arguments really haven't evolved since the 19th century."

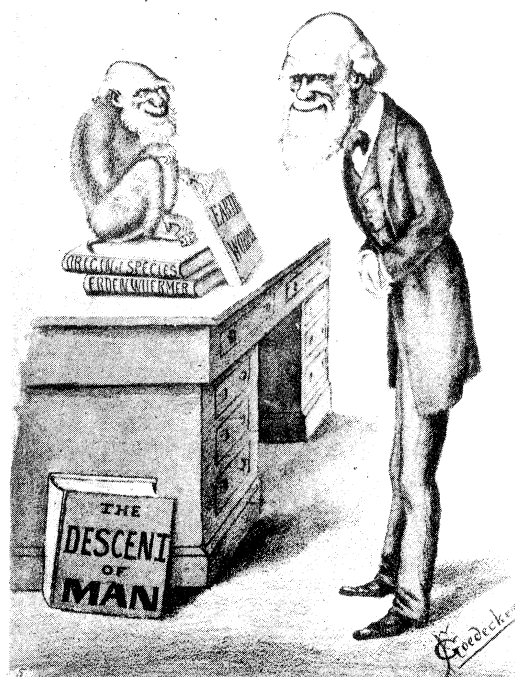
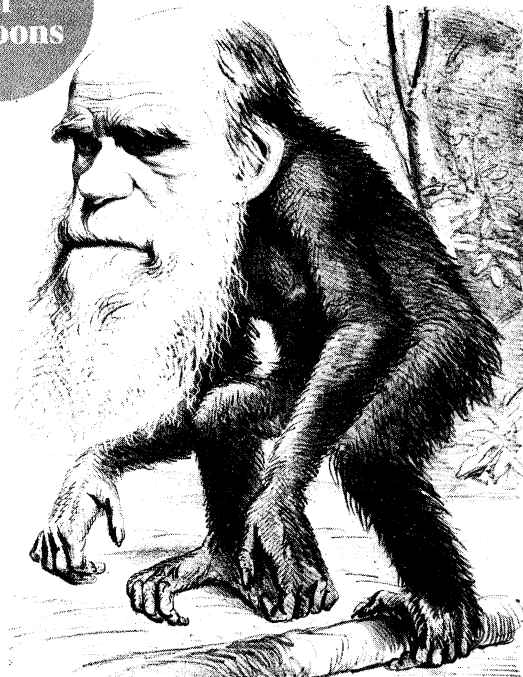
Darwin may have defended vivisection, but his comments show that, like many modern scientists, the great evolutionary theorist was acutely aware of the painful ethical issues involved.

In *The Descent of Man* (1871) he wrote: "Everyone has heard of the dog suffering under vivisection who licked the hand of the operator; this man, unless he has a heart of stone, must have felt remorse to the last hour of his life."

Darwin's scientific theories have not only stood the test of time, but grown steadily richer and more challenging in the 200 years since his birth. The same may also be said of Cobbe, his opponent, whose early adoption of the importance of animal rights blazed a trail.

As today's scientists and legislators struggle to establish the ethical relationship between the progress of science, the rights of man and our duty to animals, Cobbe's prophetic words, written in the wake of her bitter fight with Darwin, still ring true. "A sense of the Rights of Animals has slowly been awakened, and is becoming, by not imperceptible degrees, a new principle of ethics."

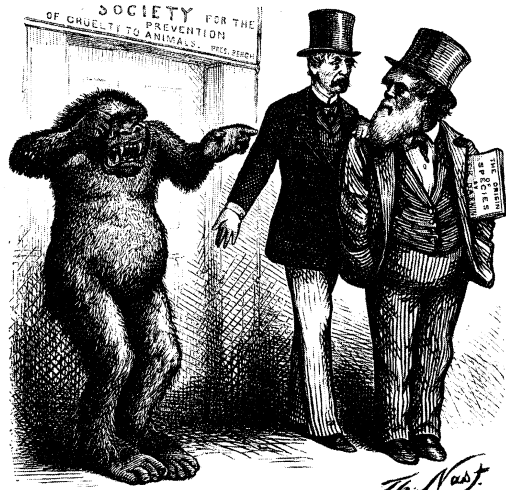
The debate continues: see Letters to the Editor, page 29



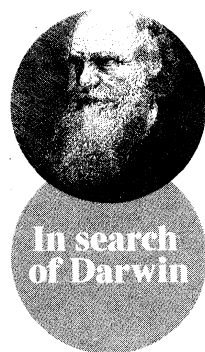
AM I SATYR OR MAN?
Pray tell who can,
And settle my place in the scale
A man in ape's shape,
An anthropoid ape,
Or monkey deprived of his tail?



"This is the ape of form"
Love's Labour Lost, act 5, scene 2
"Some four of five descents since"
All's Well that Ends Well, act 3, scene 7



MR BERGH TO THE RESCUE
THE DEFAUDED GORILLA. "That Man wants to claim my Pedigree. He says he is one of my Descendants."
MR BERGH. "Now MR DARWIN how could you insult him so?"



Kent

After extensive renovations, Darwin's home, Down House, in Kent, will reopen to the public on Friday. Darwin moved there in 1842, six years after returning from his travels.



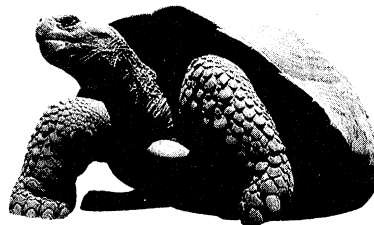
Shrewsbury

In Shrewsbury, where Darwin was born and grew up, an entire year of celebrations and events is underway, including a giant cake with 200 candles, to be unveiled today. Visitors to Shrewsbury can also visit the Mount, the Georgian house where Darwin was born, although it is now occupied by the Valuation Office.

Galápagos Islands

For something a little farther afield, Steppes Travel is offering the chance — for about £4,000 — to cruise the

Galápagos Islands in a schooner called *The Beagle* with Randal Keynes, Darwin's great-great-grandson, as the guide.



Exhibition

Darwin, the most comprehensive exhibition about the man ever curated, is at the Natural History Museum in London until April 19. *Darwin: a Revolutionary Scientist* is at the National Museum Cardiff.

Chloe Lambert

A forgotten hero: Darwin's co-discoverer

A little-known naturalist, Alfred Russel Wallace, also proposed the theory of natural selection — and this spurred Charles Darwin on to publish his great book.

By Anjana Ahuja

In the 1850s, a bearded Victorian naturalist set sail for exotic shores, determined to discover the origin of species. He returned to Britain laden with once-living bounty — mostly birds, beetles and butterflies — which he dispersed, for modest sums, to museums and cultured gentlemen. He retained specimens for himself, the study of which furnished such papers as *On the Law that has regulated the Introduction of New Species*. His investigations would culminate, in 1858, in an explanation of evolution through natural selection.

This is not Charles Darwin, but Alfred Russel Wallace, who shared joint billing with Darwin on the paper that would set the elder scientist on the road to fame. The stirringly titled *On the Tendency of Species to form Varieties; and on the Perpetuation of Varieties and Species by Natural Means of Selection*, read out to the Linnean Society in Piccadilly on July 1, 1858, raised the controversial idea of natural selection. This argued that favourable traits in a species would result in greater reproductive success for the lucky ones that carried them, and these traits — such as a long neck for eating leaves from high branches — would gradually spread. This might slowly lead to new species (say, giraffes).

The story of what happened afterwards to Darwin and Wallace might well have been entitled "On the Tendency of Co-Discoverers of a Theory to Depart Indefinitely in Their Fortunes". Darwin, whose reputation was sealed a year later with the publication of *On the Origin of Species*, lies entombed in Westminster Abbey, metaphorically rubbing shoulders with prime ministers and royalty. The bicentenary of his birth is being marked in grand fashion this week. Wallace lies in a small Dorset graveyard, flanked until recently by unchecked leylandii, his name and legacy largely unfamiliar beyond his family and a coterie of scientists and historians.

That Darwin is a national treasure and



Wallace is not a "distortion of history", according to Dr George Beccaloni, an entomologist at the Natural History Museum. "In his day, Wallace won every medal going, including an Order of Merit from the King," says Beccaloni, the museum's curator of cockroaches and related insects. "But since then, Wallace's role has been played down by some modern historians, who have even suggested that his contribution was inferior to Darwin's. What I don't like is this accidental — or deliberate — distortion of history." While Beccaloni declines to name names, the interpreta-

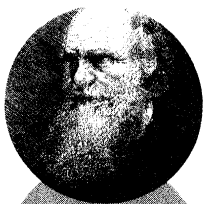
tion persists: for example, in a special Darwin issue of *Science*, Professor Peter Bowler, Professor of History of Science at Queen's University, Belfast, writes of "significant differences" in the ideas of the two.

Beccaloni, supported by Wallace's descendants, has long campaigned to win wider recognition for the forgotten co-discoverer of natural selection. He styles himself, only half-jokingly, as Wallace's rottweiler; a deliberate reference to Charles Lyell, an influential scientist who championed Darwin in his lifetime, who acquired the nickname Darwin's bulldog.

Beccaloni started a fund to restore Wallace's grave — the leylandii are now trimmed and a plaque added — and arranged for the Natural History Museum to buy correspondence and specimens from Wallace's grandson. He has edited a book on Wallace's breathtaking range of intellectual interests, which included spiritualism, social reform and epidemiology. And he is seeking to establish the ultimate memorial: the £1 million Wallace Correspondence Project, a database containing annotated copies of all the letters written by or sent to him, scattered among an estimated 100



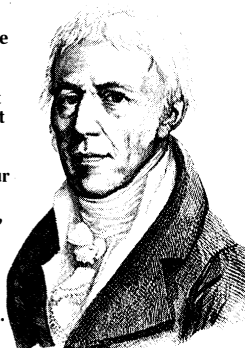
1908: The Darwin Wallace 50th anniversary celebration
timesonline.co.uk/archive



Other claimants

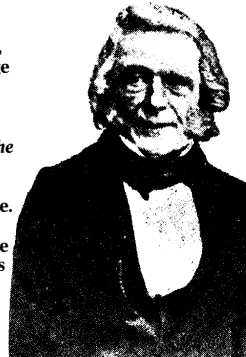
Jean-Baptiste Lamarck

In 1801, eight years before Darwin was born, Lamarck, a French naturalist, proposed that life was not fixed and that when environments changed, organisms had to change their behaviour to survive. These adaptations, he believed, would be passed to their offspring. He was attacked for his notion, but it was the first framework for evolution.



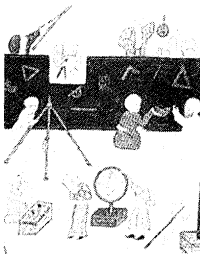
Patrick Matthew

In 1831, the Scottish landowner published a book on timber forestry, which included a passage today recognised as a description of natural selection. In 1860, after reading a review of *On the Origin of Species* in *The Gardeners' Chronicle*, he wrote to the magazine. Darwin responded and apologised for his "entire ignorance" of Matthew's previous publication.



Abu Uthman al-Jahith

Professor Jim al-Khalili argued last year that a 9th-century Baghdad scientist was the first to speculate on the link between evolution and the environment. In the *Book of Animals*, al-Jahith wrote: "Animals engage in a struggle for existence; for resources, to avoid being eaten and to breed... Animals that survive to breed can pass on their successful characteristics to offspring."



TOM PILSTON



Beagle voyage to South America in the early 1830s, during which he made extensive notes on geology, fossils and finches.

Wallace, a surveyor, pursued his scientific dreams by travelling to Brazil in 1848 and netting everything in sight for four years. He lost nearly everything when the ship sank on its way back to Britain. He and the crew were rescued and, back home, he lived on the insurance payout for two years, wrote six papers (one on monkeys) and two books on the Amazon. He also made contact with Darwin, by then a celebrated scientist.

Wallace sailed to the Malay Archipelago (now Malaysia and Indonesia), where his beetle-baiting knew no bounds. Of the 80,000 he collected, about 1,000 represented new species. He further depleted the Malay ecosystem of 40,000 other specimens, including mammals, birds, reptiles and shells. It was during this odyssey that Wallace began to form the idea of natural selection, reputedly while in a malarial fever. In 1858, he wrote an essay and sent it, by ship, to Darwin who had, by then, been sitting on the idea of natural selection for 20 years, despite warnings that others might pick up the scent and publish first. Horrified at the prospect of being scooped, Darwin sought the advice of two high-ranking scientists, writing: "All my originality, whatever it may amount to, will be smashed." Under their tutelage, Darwin, mourning the death of a baby son from scarlet fever, submitted Wallace's essay — with some additions of his own — to the Linnean Society under both their names. A year later — breakneck speed for him — Darwin delivered *On the Origin of Species*, which became a bestseller.

Why has Darwin's name survived and Wallace's all but disappeared? Natural selection wasn't really taken up as an idea until the 1930s; scholars rediscovered it largely through Darwin's book. "They focused solely on Darwin, and their accounts hardly mentioned Wallace," says Beccaloni. "The richness of the history has been lost, and, as a result, evolutionary biology has become very Darwinocentric."

Fascinatingly, Darwin became less publicly wedded to natural selection during his life, while Wallace became more so. "Wallace was more Darwinian than Darwin," Beccaloni muses. Wallace even wrote a book called *Darwinism*. Moreover, Darwin always shied away from addressing what evolution — he called it transmutation of species — meant for human beings. The idea that we might have animals among our ancestors, he considered, was too much for polite society to digest.

Still, Darwin, an undoubtedly brilliant scientist, devoted his life to working out how new species came about, while Wallace did not. Wallace's roving intellectual



JON ENOCH

Main picture, Richard Wallace, the grandson of Alfred Russel Wallace, holds a photograph of his grandfather; above, Dr George Beccaloni, who is campaigning for recognition for Wallace; below, Alfred Russel Wallace in 1848

eye led him to champion women's suffrage and land reform, diluting his claim to fame.

Beccaloni's efforts have been welcomed by 85-year-old Richard Wallace, a retired farmer in Hampshire and one of Wallace's proud grandchildren. Richard and his brother John knew very little of their illustrious grandfather when they were growing up: "We knew that he'd been an eminent man in the 19th century but my father didn't talk about him. Of course, his star had fallen somewhat. It wasn't until the 1960s that people started recognising his achievements. Students used to come from America and rummage in our attic."

Eventually, the family sold his letters and other artefacts to the Natural History Museum, although his bookcase and specimen cabinet remain in the family. The aptitude for science passed down the Wallace line — Richard's father, the youngest of the naturalist's three children, was an electrical engineer, Richard's son is a computer scientist and John was a maths teacher.

"We're very pleased that people such as George Beccaloni are pushing his case although, if Grandfather had been alive today, the lack of fame wouldn't have worried him much. He was a great friend of Darwin and, although Grandfather has been overlooked, his only concern was that the theory should come out."

The Wallace dynasty has turned out to see its forebear receive the occasional honour — the unveiling of a portrait here, the creation of a plaque there — although "we are a bit long in the tooth now". In doing so, they have crossed paths with the Darwins. What do they say to each other?

"We're never quite sure how the Darwins feel about the Wallaces," Richard says, simply. "They always choose their words rather carefully, we feel. But we get along fine. Grandfather had no resent-

ment in him. He was not at all pugnacious; perhaps I've inherited his generous nature. He didn't mind that Darwin took all the credit.

"Darwin was too frightened of the Establishment to publish his theory of natural selection — he told his wife to publish it after he died. Then along came this young upstart, Grandfather, who wrote to Darwin saying: 'This is how natural selection works, doesn't it?' and Darwin must have been quite shocked. He would not have published had his hand not been forced by Grandfather's letter."

Wallace delights in the effect his grandfather had on Darwin. And it is not implausible to suggest that *On the Origin of Species* owes its publication — and Darwin his fame — to Wallace's shock missive from Malay. Darwin was planning a huge definitive work on evolution but, after joint publication with Wallace, he was possibly inclined to speed things up a bit to strengthen his claim to priority. Says Beccaloni: "When Wallace's essay arrived, it probably prompted him to condense things (resulting in *On the Origin of Species*). Without Wallace's essay, he might have produced some huge turgid tome that nobody would have ever read, and so his theory might not have got the reception it did."

There is no evidence of bad blood between Darwin and Wallace; the joint publication in 1858 benefited them both. Darwin the procrastinator was not pipped to the post; the young Wallace could bask in his association with the most fêted scientist of the day. Although Wallace once grumbled that he had not seen the proofs of their joint paper before it was read to the Linnean Society, and Wallace's dabbling in spiritualism (he believed in life after death) displeased some of Darwin's associates, the two men shared a deep mutual respect. Wallace dedicated his book *The Malay Archipelago* — said to be a favourite of Joseph Conrad's — to Darwin in 1869 and, when Wallace hit hard times (investments made from the sale of his specimens took a dramatic tumble), Darwin lobbied for him to be awarded a government pension. Wallace was a pallbearer at Darwin's funeral.

Richard Wallace does not regret that his family name is not as well-known as Darwin's: "It would have placed a huge burden on us. We are happy with the way things are, so long as Grandfather gets a fair hearing and he doesn't sink away. He was such a brilliant man. He wrote with such clarity, and had so many facets to his character. He had an opinion on everything, and I envy him his brain. We are very proud of the fact that we are direct descendants."

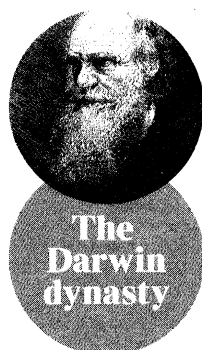
Inquiries about the Wallace Correspondence Project should be sent to g.beccaloni@nhm.ac.uk



“Russel Wallace was more Darwinian than Darwin”

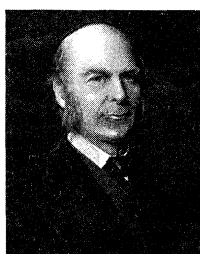
libraries and institutions worldwide: "If the nation can find £50 million to save a painting, surely we can find the money for this."

Apart from a shared interest in nature, Darwin and Wallace were very different men. Wallace, born the eighth of nine children in Wales to a Scottish father, could not match the elevated social position of Darwin, born 14 years earlier into wealth, with the blood of the Wedgwood family running through his veins. After sidestepping careers in medicine and the Church, Darwin turned his private passion for nature into a full-time pursuit by joining the



Sir Francis Galton

(1822-1911)
Darwin's cousin pioneered the field of eugenics, devoting his life to the idea of selective parenthood to improve the make-up of the human species. In his book *Hereditary Genius*, he argued that mental features are inherited, just like physical features. Darwin read the book, and it is thought that it helped him to extend his evolutionary theory to man.



Henrietta Darwin

(1843-1927)
One of Charles Darwin's daughters, Ety edited her mother Emma's letters and published them in 1904. Recently, her keepsake box was discovered by another descendant, Randal Keynes. It contained hairs that are believed to have come from Darwin's beard, carefully wrapped in tissue paper and placed in an envelope on which Ety had written: "Found after his death in my father's papers."

Ruth Padel

(1946-)
The poet and journalist Darwin's great-great-granddaughter, and has just released a book of poems, *Darwin: A Life in Poems*, about her ancestor's life. Now 62, she is chairwoman of The Poetry Society.

Sarah Darwin

(1964-)
Another great-great-granddaughter, Sarah, is a decorative artist turned botanist. In 1995 she followed Darwin's footsteps to the Galápagos to illustrate a field guide to its plants. When she returned, she led a campaign to save 20 of the islands' most critically endangered plants. An expert on the Galápagos tomato, she is now a researcher at the Natural History Museum.
Hannah Fletcher



Evolving on the screen and page

We know Darwin as an unassailable figure, but books have challenged his ideas and later this year a film will show his own doubts

film

He was one of the greatest scientists who ever lived. He was an adventurer both geographically and intellectually. He was a husband and a father whose work undermined the foundations of his own family life. So why has Charles Darwin, one of the most fascinating and complex characters that British science has produced, inspired so little cinema until now?

"It's like gold under your feet," says Jeremy Thomas, the producer of the Darwin biopic *Creation* (out in September). "You don't see it but it's there all along. I thought there must have been something about him before, but there is nothing memorable. So we get to see a figure we haven't really seen dramatised before, even though he was a complex and troubled figure ripe for a film, particularly around the time that we are portraying him."

A fictionalised version of the great naturalist appeared in Tarsem Singh's eccentric fantasy *The Fall* in 2006. Clad in a furry red coat and riding boots, Darwin found himself in the company of an African prince and Alexander The Great. But film fans will have to wait until later this year for a meaty, historically accurate exploration of his life. Adapted from *Annie's Box*, an acclaimed book by Randal Keynes, Darwin's great-great-grandson, *Creation* will link the death of Darwin's daughter, Annie, to the writing of *On the Origin of Species*.

The man tasked with bringing Darwin to life is the screenwriter John Collee, who has drawn on Darwin's work before. For his last film, *Master and Commander*, Collee found inspiration in the scientist's journals of the *Beagle* voyage. Having worked with the actor Paul Bettany on the movie, he urged the *Creation* team to cast him as Darwin. "Not only is Paul a brilliant, intuitive actor, he's very similar to the younger Charles Darwin in physique and colour-

ing," he says. And Bettany's real-life wife Jennifer Connelly plays Darwin's beloved spouse, Emma.

The Darwin we'll see in the film is, says Thomas, "a troubled character who knew that his ideas were going to trigger a profound change of balance in the status quo and it made him ill." He is a tortured genius, far removed from the assured, bearded elder statesman of the public perception.

"What happens to most historically significant figures," Collee explains, "is that they become preserved in aspic at the time when they were at the height of their fame. Afterwards people find it difficult to imagine what they were like before that point. This has happened to Darwin, who became a legend in old age and is remembered as the grand establishment figure."

"But of course drama is about change and what interested me was what he suffered along the way to finally achieve that aura of unassailable gravitas. He was deeply in love with a woman who disagreed profoundly with his theory. He cherished his children and saw three of them die. He suffered horribly from a lifelong illness that may or may not have been psychosomatic. He studied to be a parson and wrote the book which killed God... I wanted to write about that guy."

So what was the key to understanding Darwin the man and bringing him to life in the screenplay? Collee cites Randal Keynes's statement in the foreword to *Annie's Box* that Darwin's life and work were all of a piece.

"His love for his wife, his observations of his children, his friendships with gardeners, schoolteachers and pigeon fanciers, his fears about death, revolution, bankruptcy, inbreeding... all these things found their way into his theory. He was the most inclusive of thinkers."

Wendy Ide

books

Those who feel that they already know enough about Darwin had better hide in a cave. His 200th birthday and the 150th anniversary of the publication of *On the Origin of Species* will be celebrated in song and fable, or their modern equivalents. Darwin's modern interpreters, the heirs of T. H. Huxley, believe the honours being done him are no more than his due. His big idea of natural selection gives biology its guiding principle, says Richard Dawkins.

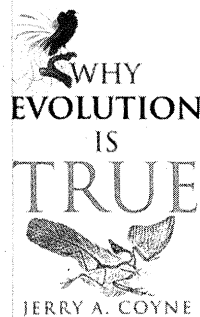


Paul Bettany as a young, troubled Charles Darwin in the forthcoming film *Creation*

One reason why Darwinism has retained its potency is because it has been subjected to a near-constant series of attacks over the past century and a half, on many different fronts. Darwin knew his idea was incendiary so spent years gathering data to support it, aiming to bury his critics under an avalanche of information. His idea, the survival of the fittest, was in part inspired by reading Malthus's gloomy predictions on the future of the human race. His ideas retain their vitality because they are timeless, bearing on issues that continue to perplex. Adrian Desmond and James Moore, for example, argue in *Darwin's Sacred Cause* that his hatred of slavery was one motive for his insistence that mankind was a single species with a common origin. They believe his evolutionary researches were fired by moral passion and had humanitarian roots.

At the time, scientists who believed in the immutability of species also believed that black and white people sprang from different origins and were, indeed, distinct species. This false belief underpinned slavery and later racism. The fact that people of different races can readily interbreed, meaning that they are members of the same species, had little effect on the heat of the debate. But here Darwin was not only right, but brave. If his view of the unity of mankind had been heeded, we might have been spared much human misery.

But might there not be a price to pay for undermining religion? This is one of the themes of James Le Fanu's attack on Darwin, *Why Us?* By setting aside the notion of Man as a free moral agent, distinct in this



Why Evolution is True
by Jerry A. Coyne
(Oxford, £14.99)

Why Us? How Science Rediscovered the Mystery of Ourselves
by James Le Fanu
(Harper Press, £18.99)

Darwin's Sacred Cause: Race, Slavery and the Quest for Human Origins
by Adrian Desmond and James Moore (Allen Lane, £25)

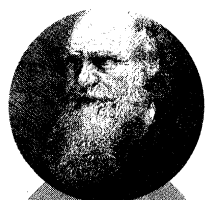
On the Origin of Species anniversary edition,
by Charles Darwin
(Penguin Classics, £30)

respect from animals, and replacing it with the philosophy that the strong will triumph over the weak. Le Fanu charges Darwin with cutting mankind adrift.

Darwinism transcends biology, but the problem with such elastic ideas is that they can be stretched. In the 1950s William Hamilton, then a student at Cambridge, complained that most of the biologists there didn't believe in evolution. Today they do, in part thanks to Hamilton's brilliant use of evolutionary theory to explain human social traits such as altruism. With the help of Richard Dawkins, the new field of evolutionary psychology emerged.

This makes some biologists uneasy. In *Why Evolution is True*, the American evolutionist Jerry Coyne deplores the tendency of psychologists, biologists and philosophers to Darwinise every aspect of human behaviour. Some behaviour may have evolved because it is adaptationist, he acknowledges: but not everything in nature, or human nature, is driven by Darwin's evolutionary engine. Social Darwinism may be dead, but psychological Darwinism is now staking its claim.

Coyne's book is just what was needed in this bicentennial year to anchor Darwin where he belongs. It is calm, clear, detailed and utterly convincing. One feels like echoing the sentiments of Georgiana Lowe, who read *On the Origin of Species* at a single sitting and announced: "Well, I don't see much in your Mr Darwin after all: if I had had his facts, I should have come to the same conclusion myself."
Nigel Hawkes



He'd have turned in his grave

Nazi 'science'

Leading Nazis revealed in their writings that natural selection had a major influence on their race policy. Hitler used the idea of group inequality, a key feature of Darwin's survival of the fittest theory, to prove the existence of "superior" and "inferior" races and provide the premise for the Holocaust.

The Darwin Awards

Not an event to celebrate achievements in botany but an annual celebration of tragic (and plain stupid) accidents. The winners last year included an unfortunate shopping cart joyrider, a man who passed an electric current through his nipple piercings to see what would happen, and a Catholic priest whose audacious attempt to set the world record for clustered balloon flight did not quite go to plan.

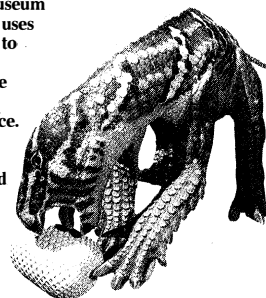
Darwin, The Musical!

The science historian Richard Milner has taken his one-man show, *Charles Darwin: Live & In Concert*, across the world. Complete with a white beard, bowler and cape, he transforms the famously shy scientist into a performer who sings about trilobites, garfish and tortoise shells. Thanks, Dick, but we'll stick with *Mamma Mia!*

The Creation Museum

Adam and Eve walk with dinosaurs at this museum in Kentucky, which uses animatronics to try to reconcile a literal interpretation of the Bible with the discoveries of science. We can just about accept the triceratops on board Noah's Ark. But, having seen *Jurassic Park*, we cannot believe

that Noah could have stopped those pesky velociraptors from eating half the cargo.



Beagle 2

"HMS Beagle led to our knowledge about life on Earth making a real quantum leap. We hope Beagle 2 will do the same thing for life on Mars," said Professor Colin Pillinger before Britain's ill-fated mission to the red planet. To this day, nobody knows whether the craft ever reached the surface of Mars, let alone enraged its residents with its space soundtrack (composed by Blur).



Carol Midgley

It's obvious... if Darwin were alive today, he'd be Simon Cowell

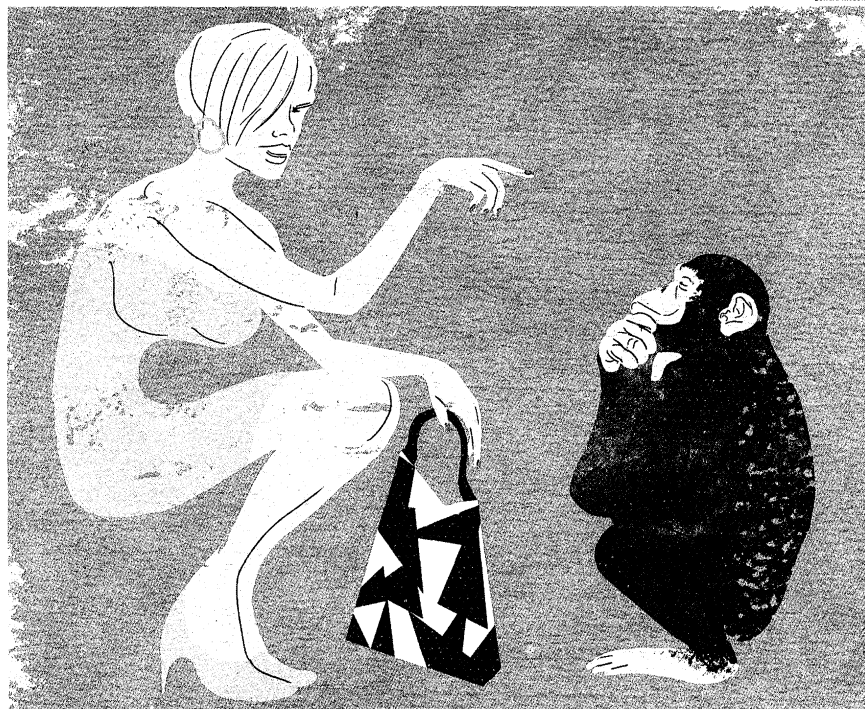
How would Charles Darwin feel if he were alive today, a radio show asked this week? Much like the rest of us I imagine — pretty depressed. Oh, I suppose he could enjoy a smug “told you so” over the Vatican’s admission on Tuesday that the theory of evolution may, erm, be on the right track after all. And he could have a laugh by clicking on www.creationism.org and discovering that there are still people who believe that Noah really did squeeze all those animals on to the Ark because, and this is a quote, “one could fit, for example, a dozen brachiosaurus eggs in the trunk of a car, with room to spare!”

But there'd be bad stuff too. On the *Origin of Species* wouldn't be much of a seller down at W H Smith because there's no tie-in fitness DVD and he doesn't have a story to tell about his time in rehab. It's doubtful he'd get his own series with the BBC because they've already got one beardie talking about Nature and that's Bill Oddie.

And I reckon he'd be consulting his lawyers right now about the weird, commemorative £2 coin that the Royal Mint has just brought out in his honour. Have you seen it? It features a picture of Darwin gazing into the eyes of an ape with an expression that seems to say: “Your place or mine?”

But I'd guess the thing that would most depress Darwin in 2009 would be that he'd start to wonder whether he'd got his theories all wrong. I certainly would. It is hard, for instance, to swallow the idea of natural selection when you gaze upon the über-rich creature that is Jocelyn Wildenstein. This is a woman who spent a reported £2.7 million on cosmetic surgery and once said: “I lost my peripheral vision after my last cheek implant but I weighed it up carefully and realised I only used it for driving, so it was a decision I could live with.”

In centuries past it was easier to believe in concepts such as the survival of the fittest. If you had good-quality food to eat and a decent gene pool you flourished and lived, and if you didn't, you withered



Edward McGowan

and died. Simple. The ascending breeds were recognisable from having plenty of fat on their bones and a glass of fine port in their hand, denoting wads of money and a place high up the chain. The weakling underclass, too, were easy to spot because they were the ones with sunken eyes, stumpy teeth and xylophone ribcages who died at 25 because they had to last an entire winter on three turnips.

But not any more. Oh no. If we look again through the demented prism of the 21st century, we'll see that the reverse applies. It's not about survival of the fittest now but the triumph of the thinnest. Today, the second that people — especially famous, Western, female ones — acquire wealth, the first thing they do is stop eating, or, alternatively, gorge themselves on chocolate and regurgitate it all into their lavatories. Then they

flaunt their skeletal frames in *OK!* and *Heat* magazine, usually with an oversized Birkin bag, looking just like the starving peasants of yore, for which they are roundly admired and envied.

Living through an entire winter on cabbage soup is not a sign of bereftness any more but of abundance: “I'm so successful I can afford the time to starve myself!” The more money you have the fewer offspring you tend to produce, lest you pollute the planet and are unable to afford that extra skiing holiday.

Meanwhile, it's the very poor who have become fat, piling on calories with cheap BOGOF pizzas and fizzy cola and being followed round by TV documentary crews so that we can all sit back and gawp at the lardbuckets.

Some believe, controversially, that this progeny breeds far more successfully and

rampantly than any other in order to cash in on something known as “child benefit”. But that's really a specialist subject and one that is best left to *Wife Swap*.

I wonder what Darwin would think today if he was shown a picture of Victoria Beckham — an unhappy-looking specimen who seems so malnourished that if she collapsed in the savannah the hyenas would barely think it worth the bother — and told that this is what millions of females aspire to. Or Jodie Marsh, who has swapped her breasts for 32GG spacehoppers and endured five hours of surgery to acquire a set of perfectly symmetrical, toilet-porcelain veneers on her teeth — “giving a smile”, according to a leading dentist, “that bears little resemblance to what is human and natural”.

Something has gone wrong with evolution. It seems to be going backwards. Devolving, if you like. Thomas Hardy's plump, desirable, fecund wench is today's mocked, self-loathing yo-yo dieter, who is patronised by Trinny and Susannah and tempted to either get liposuction or wear Spanx pants.

Now that there are vaccines, medicines and life-support machines to help us to combat disease, the fight to survive, in the developed world at least, has become a bit too easy-peasy. So we have switched our fight from prevailing physically to prevailing socially. Having your toes straightened to fit into designer shoes or a couple of ribs removed to facilitate a waspish waist may weaken the body and make you not such a dab hand in the wild but, hey, think of the social victory.

In fact, the nearest we get to witnessing the survival of the fittest today is in watching *The X Factor*, *Big Brother* and *Britain's Got Talent*. This is where the too freakish, the too old and the too ugly get weeded out and killed off in the early stages so that the path is clear for the talented and physically attractive to win.

Come to think of it, Darwin might have made a good panellist on a naturalist version of *The X Factor*. He'd have been just as brutal as Simon Cowell. “On that performance, and being totally realistic, you'll never survive out there,” you can imagine him saying, to boos from the audience. “Your body's too heavy, your beak is just weird and you can't even fly. I'm sorry, Dodo, but it's a 'no' from me.”

“
The nearest we get to witnessing the survival of the fittest today is in watching The X Factor
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