

Darwin's Island

The Galapagos in the Garden of England

Steve Jones

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Extract

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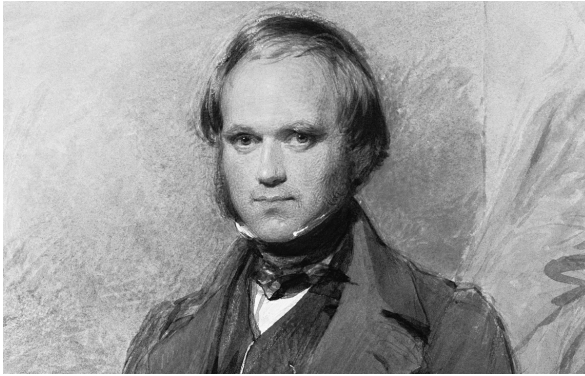
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INTRODUCTION

THE DARWIN ARCHIPELAGO



Charles Darwin, as every schoolchild knows, saw the finches of the Galapagos in the years he spent there while employed as official naturalist on HMS *Beagle*. Each island had its own species, and Darwin soon worked out that they shared descent from a common ancestor; that they were a product of evolution. On his return to England he at once published his theory in his book *Origin of the Species*, which went on to prove that men had descended from chimpanzees. Nature, red in tooth and claw, had used the survival of the fittest to weed out the imperfect and, with *Homo sapiens* at the top of the evolutionary tree, had achieved her desired end. Racked by guilt at replacing the doctrines of the Church with a joyless vision of man as a shaven primate in an amoral universe, Charles Darwin retired into obscurity. He repented his blasphemy on his deathbed and was buried as a venerable and almost forgotten savant whose work – like that of so

many famous scientists – had been completed while he was still a young man.

That is an entire parody of the truth. Darwin was not a hired biologist but paid for his own trip as gentleman-companion to the *Beagle's* captain. He spent but five weeks of the five-year voyage in the Galapagos, with just half the time passed on shore, on only four of the dozen or so members of the group. He had little interest in his collection of finches and lumped their corpses together as a jumbled mass without even making a note of where they came from. Many of the famous birds live on several islands rather than one. Two decades passed before the publication of *The Origin of Species* (in which the word 'evolution' does not appear) and in that time its author wrote several substantial books. The phrase 'the survival of the fittest' is not his but was invented by the philosopher Herbert Spencer to summarise the notion of natural selection, the central element of evolutionary theory. The bloody fangs and fingernails of Mother Nature were themselves thought up by Tennyson a decade earlier not as a philosophy of life but in memory of the death of a friend. Evolution has no end in view and men do not descend from chimps, although the two share a common ancestor (an idea not explored by Darwin for a dozen years after *The Origin*). The Church soon accommodated his ideas, which, as most clerics realised, have no relevance to religion and the deathbed conversion is a simple falsehood, even if the great naturalist was buried in Westminster Abbey, where he still lies, trampled by tourists.

The most widespread error is to assume that the *Beagle* voyage marked the end of Charles Darwin's scientific career. In fact, in the four decades that remained to him after he came home from the wilds in 1836, Captain Fitzroy's gentleman-companion worked as hard as or harder than he had as a young man. He soon purchased Down House, south of London, in the eponymous village (whose name gained a terminal 'e' at the insistence of the Post Office, a rule that Darwin ignored).

At first he saw the place as dull and unattractive enough, but before long the house was transformed, with the help of his considerable fortune, into a grand but comfortable mansion. Its owner settled in the land of his birth and never left again: uxorious, paternal and reluctant to leave his extensive garden except on forays to test his theories and, now and again, to search for better health. As he wrote, with some satisfaction, many years after moving in: 'Few persons can have lived a more retired life than we have done . . . My life goes on like clock-work and I am fixed on the spot where I shall end it.' So settled was he that he described his profession as 'farmer' in the Bagshawe's *Directory* of the time. Great Britain was the first and last of the forty islands he visited and the patriarch of Downe studied its natural history in far more detail than he had that of anywhere else. His own county of Kent – the Garden of England – was as much, or more, a place of discovery than had been the jungles of the Amazon or the stark cinders of the Galapagos. The British Isles were where Charles Darwin built his reputation.

This book is about the disregarded Darwin, the most illustrious figure in biology, and about his years of work on the plants, animals and people that make their home in the land of his birth. *The Origin of Species* is, without doubt, the most famous book in science. It celebrates its hundred-and-fiftieth anniversary in 2009, which marks in addition the author's bicentenary.

To remember that *magnum opus* alone would be as foolish as to celebrate Shakespeare just as the author of *Hamlet*. The great naturalist's lifelong labours generated an archipelago of information; a set of connected observations that together form a harmonious whole. He wrote six million words in nineteen published works, hundreds of scientific papers and innumerable letters, fourteen thousand of which survive. Although – because of the famous note from Alfred Russel Wallace that bounced him into writing *The Origin* – he never finished his *magnum opus*, his 'big species book', much of its planned contents appeared as a series of separate volumes throughout his lifetime. Biology emerged from that

gargantuan effort as a unitary subject, linked by Charles Darwin's grand idea of common ancestry, of evolution. The volumes that poured from his comfortable study were guidebooks that made sense of a whole new science. They allowed its students to navigate what had, before his day, been an uncharted labyrinth of shoals, reefs and remote islets of apparently unrelated facts.

The Origin itself was in truth no more than a prologue to the great man's career. It is as much a work of reportage as it is of research. Most of his other publications are, in contrast, based on his own observations and experiments and explore, with his trademark enthusiasm, what appear at first sight to be almost unrelated aspects of the natural world. Darwin's domestic works, as they might be called, are, in order of appearance and with titles somewhat truncated: *Barnacles* (in four volumes), *Orchids and Insects*, *Variation under Domestication*, *The Descent of Man*, *Expression of the Emotions*, *Insectivorous Plants*, *Climbing Plants*, *Cross and Self-Fertilisation*, *Forms of Flowers*, *Movement in Plants* and *Formation of Vegetable Mould by Earthworms*. *The Origin* has but a single illustration, but most of the others are filled with line drawings, engravings and plates, almost five hundred altogether (and some find a place in the present pages). *The Expression of the Emotions* was one of the very first scientific books to be illustrated with photographs.

His literary oeuvre was aimed at a wide audience and is set out in good, plain Victorian prose. He wrote to Thomas Henry Huxley in 1865 that 'I sometimes think that general and popular Treatises are almost as important for the progress of science as original work.' Charles Darwin was the first popular science writer – and his publisher appreciated as much for he gave *The Origin* equal billing with Samuel Smiles's quintessentially Victorian work *Self-Help*, which appeared on the same day. The author himself realised the public's interest in his work for he was one of the first among that dubious breed of scribblers to negotiate a pre-publication cash advance before settling down at his desk. Unlike most of his intel-

lectual descendants, Darwin's command of foreign languages was good enough to allow him to pick up some of the atrocities committed on his manuscripts by their translators and he spent much time anguishing about quite what French or German phrase best approximated to his central notion of 'natural selection'.

Here I attempt to bring his lesser-known writings up to date for the modern age and to place the world's pre-eminent biologist firmly in the context of his native land. His literary canon makes sense only when considered as a whole. At first sight its subjects seem almost disconnected – earthworms, inbreeding, barnacles, plant hormones, domestication, insect-eating plants and the expressions of joy or despair in dogs, apes and men – but in truth all share a theme: the power of small means, given time, to produce gigantic ends. Fond family man as he was, he saw no gulf between the powers that had made his wife and children and those at work elsewhere. His concerns about the risks of marrying his cousin were tested with experiments on flowers. In the same way, an interest in the emotions of animals led to a comparison of the expressions of his infant son with those of dogs and apes. Different as his children might be from such humble creatures, all had emerged through the action of the same biological forces; through evolution, or 'descent with modification'. The notion, and his willingness to apply it to ourselves, outraged some of his fellows. It leaves many people uncomfortable today.

Biology has plenty of heroes but Charles Darwin is unique, for he was a pioneer in so many of its branches. He became a better scientist as he grew older for he began to test ideas with his own hands-on research, much of it far ahead of its time, rather than collating the results of others, brilliant as the synthesis might be; as he said later in life, 'I am like a gambler, & love a wild experiment.'

A good portion of the educated public has heard of *The Origin* and *The Voyage of the Beagle* but his other works are almost unknown. Most biologists are familiar with at least some of them

for each volume is a milestone in their profession. The *Earthworms* epic founded modern soil science, *Emotions* saw the dawn of comparative psychology while *Cross and Self-Fertilisation* and *Forms of Flowers* were each an attempt to understand the origin of sex. The experiments described in *Movement in Plants* gave the first clue to the existence of hormones (although the word had not been invented and their discovery in animals had to wait thirty years). Their author also wrote on carnivorous plants, on the links between insects and orchids, and on the origin of our domestic plants and animals (and there he grappled with the nature of heredity, and almost got it right, with talk of crosses between round and wrinkled peas). Even his four books on barnacles, obscure as they appear, are important, for they showed that juvenile forms reveal more about relatedness than do adults and that bodies as complicated as our own are built on a simple plan. For barnacles and all other creatures his mechanism of natural selection generates organs of impressive perfection not by design but by tinkering with whatever raw material is available.

The Descent of Man, and Selection in Relation to Sex, to give its full title, stands rather apart from the rest. The book appeared in 1871 and was both the first real treatment of human evolution and an introduction to the importance of sexual conflict in evolution. It sets out the entire Darwinian argument with reference to a single group of creatures: man and his relatives. *Descent*, like *The Origin of Species*, is in the main a compilation of the results of others. Even so, it fits well into what might be called the Down House School and I use it here as an introduction to the world of modern evolutionary biology as illustrated by ourselves and our primate relatives. The study of our past has been transformed. If the author of *The Origin* were to rewrite that famous work today he would turn for many of his examples not to pigeons and tortoises, nor to worms and barnacles, but to his fellow citizens. *The Origin's* sole mention of *Homo sapiens*, the tentative claim that 'Light will be thrown on the origin of man and his history', has

been wonderfully upheld. It shows how the truths glimpsed by Darwin now unite the whole science of life.

Here I attempt to update all those topics for today. I append an *envoi* with a look at the biological world of the twenty-first century compared with its state in 1859. In the tradition of the great naturalist himself, who was dubious about the many infantile attempts to apply his ideas to society (as in a newspaper's claim that his work proved that 'might is right & therefore that Napoleon is right & every cheating tradesman is also right'), I avoid as far as possible any discussion of the relevance of Darwinism to the human predicament. I also steer clear of the empty arguments about its interactions with religion. The struggle to separate science from theology still fascinates a few, but most scientists have no interest in it (although there are exceptions, for the Victorian biologist Thomas Henry Huxley felt that 'Extinguished theologians lie about the cradle of every science as the strangled snakes besides that of Hercules'). Today's biology in its success emphasises how little relevance it has to the issues so often, and so tediously, discussed by non-biologists. As Darwin put it in *The Descent of Man*: 'We are not here concerned with hopes or fears, only with the truth as far as our reason allows us to discover it.' Science can do that, and no more.

My eminent predecessor at University College London, the Nobel Prize-winner Peter Medawar, in an acerbic comment on the relative merits of students of science and the arts, said of Watson and Crick (of double helix fame) that 'Not only were they clever, they had something to be clever about.' Not only did Charles Darwin travel, he had something to travel for. The joy of the *Beagle* voyage was that it had a point. For a real adventurer, to travel hopefully is not enough: some end must be in view. As he wrote in the last pages of his account of the journey: 'If a person asked my advice before undertaking a long voyage, my answer would depend upon his possessing a decided taste for some branch of knowledge, which could by this means be advanced.'

Darwin's odysseys, from the Galapagos to West Wales, play an important part in all his books, as they did in the author's life. The *Beagle* crossed nearly fifty thousand kilometres of ocean but his British journeys covered almost as much country. His work was always tied to where he found himself, whether in a rain forest or a suburb. Many of his compositions emerge from a kind of Grand Tour of the British Isles. His very first memory, as recounted in his autobiography, was of a visit to Abergele for the sea-bathing at the age of four. Six years later he was back on the Welsh coast at Towyn, where he noted some 'curious insects' (black and red Burnet Moths) not seen around Shrewsbury. Unlike the many naturalists of those times who filled cabinets with butterflies or shells to make a biological stamp-collection, he wondered, even as a child, quite why they were found in one place and not another.

As he grew older, natural history became an all-embracing passion. His early enjoyment of literature, art and music disappeared and he wrote that 'I have tried lately to read Shakespeare and found it so intolerably dull that it nauseated me.' His preferred reading consisted of romantic novels (the sillier the story, the better, said his children) and he sold off his family heirlooms of Wedgwood pottery and Flaxman reliefs. He could make out 'absolutely nothing' of what merit there was in a collection of Turner watercolours. 'My mind', he wrote, 'seems to have become a kind of machine for grinding general laws out of a large collection of facts, but why this should have caused the atrophy of that part of the brain alone, on which the higher tastes depend I cannot conceive' (although he did send the *Expression of the Emotions* book to art journals for review, where it was criticised for its insensitivity to the nature of Art).

That obsession with science allowed Charles Darwin's juvenile interest in the insects of England and Wales to grow into a lifelong exploration of the biology and geology of his native island. He published his first scientific paper, on the eggs of an animal found

in the Firth of Forth, in the twelve grey months he spent in Edinburgh. After a brief visit to Dublin, the young enthusiast then moved to Cambridge, where he spent many days knee-deep in bogs and fens in the search for specimens. Just before the departure of the *Beagle*, he travelled for three weeks across North Wales from Shrewsbury to Conwy and Barmouth with the geologist Adam Sedgwick, who taught him the elements of mapping so useful on the voyage. On his return he set off again to Scotland, where, in his first major scientific paper, he made a frightful error in his evaluation of a series of parallel shelves or 'roads' in Glen Roy as wave-cut beaches rather than the shores of drained glacial lakes (as he wrote many years later, 'I am ashamed of it'). Later in life he criss-crossed Britain to pursue his researches or to take his family on holiday, or to escape the epidemics of infection that now and again swept through Downe (and killed two of his own children). They went to Wales, to the Isle of Wight (where he met Alfred, Lord Tennyson), to Torquay, to the Lake District (an audience there with Ruskin), to Stonehenge, to the heathlands of England and to a variety of grand mansions across the kingdom. Often, his experimental subjects – pots of orchids or of insect-eating plants – travelled with the family, at considerable inconvenience. He had plenty of time to explore the British Isles for in his forty years at Down House Charles Darwin spent two thousand nights away from home – the equivalent of a day a week. A few of his trips lasted a month and more.

Some of his travels were in search of science, but many were a quest for health. He became chronically ill very soon after his return from the *Beagle* trip and his heavy use of snuff and tobacco did nothing to improve his well-being. Darwin visited spas in Great Malvern, in Guildford and in Ilkley (where he received the first copy of *The Origin*). His later years were marked by a series of bizarre attempts to remedy his feeble state (even if he did write that illness, 'though it has annihilated several years of my life, has saved me from the distractions of society and amusement'). The

main symptom was vomiting, often brought on by stress, with the rushed last chapter of *The Origin* sparking off a severe episode that caused great prostration of mind and body. So severe were the attacks that he declined some invitations to stay in friends' houses on the grounds that 'my retching is apt to be extremely loud'.

He tried Condyl's Ozonised Fluid, 'enormous quantities of chalk, magnesia & carb of ammonia', and rubber bags filled with ice and worn next to the spine. Nothing worked (although he learned to play billiards at one of the establishments and became a devotee of the pastime, which helped him to relax and, as he said, 'drives the horrid species out of my head'). The author of *The Origin* was a victim of the Victorian 'Demon of Dyspepsia' and was joined in that unhappy throng by Thomas Carlyle, George Eliot, Charles Dickens, Florence Nightingale and the evolutionists T. H. Huxley, Alfred Russel Wallace and Herbert Spencer, together with his own brother Erasmus. Their troubles funded several pharmaceutical fortunes (including that of Henry Wellcome, which later helped pay for that Darwinian triumph, the sequence of human DNA). What his condition might have been is not known: a supposed conflict between Christian belief and rationalism, or a parasite picked up in Brazil or even, some say, the obsessive swallowing of air. He was diagnosed as having 'waterbrash' – heartburn, in modern parlance, the reflux of acid from the stomach – which can result from an ulcer. Dyspepsia's nausea, depression and lassitude are, we know today, caused by a bacterium. The bug that swept through Victoria's intellectuals might now be cured with a simple pill.

Later in life, in part because of his health, the paterfamilias of Down House spent longer and longer periods without leaving home. He fed his household with fifty-three distinct varieties of gooseberries and three of cabbage. In his garden he carried out many experiments, helped by William Brooke, his 'gloomy gardener' (who was seen to laugh just once, when a boomerang broke a cucumber frame). The naturalist's tale ends, in the

tradition of the classics, with the hero's death and his desire to join his beloved earthworms in the 'sweetest place on Earth', the village churchyard at Downe – a wish frustrated by fame, the establishment and the Abbey.

Darwin's Island retraces some of Darwin's steps and moves his discoveries forward by a century and more. It will, I hope, help bring his less well-known work into the third millennium. Several people have helped in the preparation of this book. David Leibel, Michael Morgan, Kay Taylor and Anna Trench made helpful comments on parts of it. I thank them for their help.

Three of my earlier volumes – on coral reefs, on the nature of maleness and on the theory of evolution itself – pay homage to the founder of the science of life, and each is an attempt to update his ideas for the modern age. There could be no better way to honour the most famous of all biologists at this time of concentrated attention on his history than to give his less celebrated works the exposure they deserve. For Charles Darwin, the five *Beagle* years that became part of Britain's intellectual legacy led to four decades of intense labour within the confines of his native land. In that modest group of islands he underwent a second great voyage: not of the body but of the mind. This book traces that journey from its beginning to its end.