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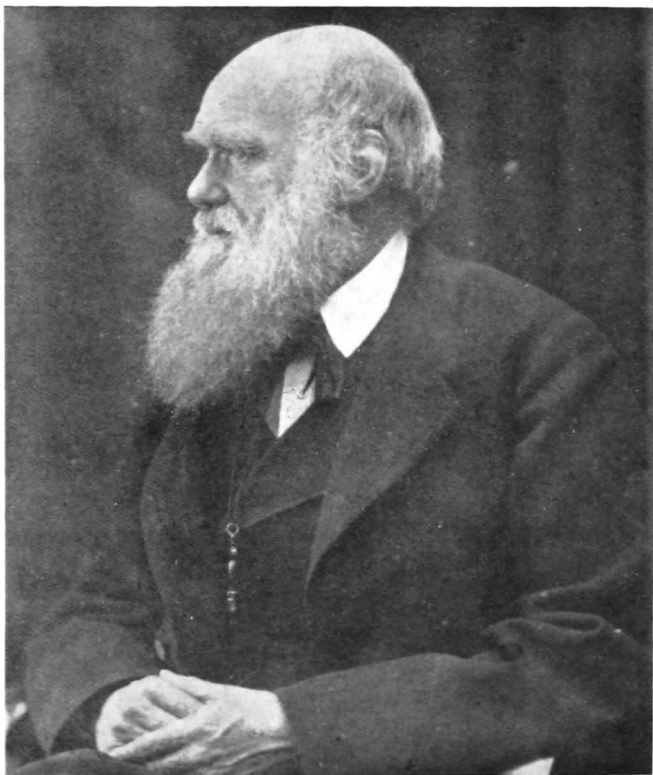
A series of short biographies



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DARWIN

L. B. Pekin



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Chapter I: Early Life

THE life of Charles Darwin may be told simply in a few words. He was born in 1809, the son of a doctor at Shrewsbury. He was educated in the classics at Shrewsbury School, where he showed no signs of great mental ability; he studied medicine for a while at Edinburgh, and obtained a pass degree at Cambridge with the intention of taking holy orders. An offer to sail as unpaid naturalist in an Admiralty barque upon a world voyage appealed to his scientific interests, and during five years' absence from England he amassed a large number of facts about geology and natural history, and laid the foundations of a theory of organic evolution. On his return he married, and published a few scientific papers. Continued ill health forced him to seek a retired life in the country. He settled at Downe in Kent, where his family grew up, and spent practically the whole of the rest of a long invalid life there, in experiments and research in natural history. He published his findings in a series of books, the chief of which were *The Origin of Species*, *Variation of Animals and Plants under Domestication*, and *The Descent of Man*; and his theories gradually won acceptance in the face of great opposition. He became widely honoured for

the power of his thought and the nobility of his character, and died in 1882.

This sounds, perhaps, a far from exciting life; but in fact Darwin is not merely one of the "great men" whose claim to the title is absolutely beyond dispute, but—quite apart from the effect his writings had on the world—an obviously interesting person. It is impossible to read his works without being permanently influenced by them, and impossible to get to know something of the man without loving him. In a sense, he had every advantage: he inherited particular gifts from a remarkable family, which were likely to lead him to eminence as a man of science; he fell in with good and helpful friends who encouraged his natural talents; he lived at a time when old beliefs were crumbling and the world was waiting for what became "his" theory; he had the private means to devote himself to years of research. But there is much more to his story than that: he is not great because of the Darwinian theory, but because of the man that he was—wise, patient, humane, chivalrous and humble. It is difficult to catalogue a man's virtues like this without appearing to stiffen him into a statue—what the world calls a plaster saint, and generally, perhaps wholesomely, dislikes. But there is little stiffness in Darwin: with all his "greatness," which in a way seems to take away from a man's ordinary humanity, he is a delightful, salty, human and often humorous character.

His grandfather, Erasmus, was a well-known eighteenth century doctor, writer and crank, whose works include such fascinating titles as *The Loves of the Plants* and *Female Education in Boarding Schools*. In his poems he dealt with surprising subjects in a surprising way—one may come across an account of the formation of KNO_3 , or the prophecy of an aeroplane, each described in the pompous heroic couplets of his time. He was a teetotaler (a strange thing to be in that age), held revolutionary ideas about bringing up children, and loved ingenious mechanical contraptions: a home-made telegraph, a “talking head,” which produced the sound of a few consonants accurately, a wind indicator consisting of a vane on the roof which operated a dial in his study; and he adorned the margins of his extraordinary poems with comments on everything from theories of art to opium eating, from divining-rods to the Gulf Stream. Darwin’s father was a successful doctor with remarkable powers of observation, almost of thought-reading. He was an enormous man physically, as Erasmus had been, a lover of natural history, high spirited and at the same time repressed (as Erasmus never was), with the quick temper that often goes with a sensitive and affectionate nature; and Darwin always spoke of him with deep love and respect. He married Susannah Wedgwood, eldest daughter of the famous potter, and Charles was the fifth of six children. The only other boy was Erasmus, with whom Charles had a very close lifelong friendship; he was, like his brother,

gentle and warm-hearted, and had mainly literary interests.

His mother died when Darwin was eight years old, and he hardly remembered her. There is a portrait of the boy about this time, together with his sister Caroline: a sturdy person in a velvet coat with shiny buttons and lace collar, clasping (prophetically) a plant in a pot, with firm round face, hair hanging over his forehead, bright eyes and the Darwin nose already plainly formed, and good, well-chiselled lips. No legends of his childhood survive, certainly no special suggestions of future greatness. He was sent to a local day-school, where he had the usual small boy's passion for collecting, and was at the same time timid and mischievous. At nine he proceeded as a boarder to Shrewsbury School, where he remained seven years. In later life he answered a questionnaire on his education as follows: How taught?—"I consider that all I have learnt of any value has been self-taught." Peculiar merits of education?—"None whatever." Chief omissions?—"No mathematics or modern languages, nor any habits of observation or reasoning." He lived an active open-air life, but learnt, as he said, "absolutely nothing, except by amusing myself by reading and experiments in chemistry." For years on end, he had to grind at the classics; he would learn forty or fifty lines of Virgil or Homer during morning chapel, and forget them completely in forty-eight hours. He emerged with a liking for some of the odes of Horace, and was told by a disappointed father, "you care for

nothing but shooting, dogs, and rat-catching, and you will be a disgrace to yourself and your family." Clearly he was not lazy: he preferred difficult subjects to easy ones, delighted in the clear geometrical proofs of Euclid which were taught him by a private tutor, would sit for hours in a window recess reading Shakespeare, Byron and Scott, and helped his brother Erasmus' experiments in their laboratory in the garden tool-shed at home, thereby earning the nickname of "Gas."

His father saw that he would do no good by remaining at school, and sent him to join Erasmus, who was studying medicine at Edinburgh, where he remained for two years. He was bored by the lectures on chemistry, and disgusted by those on anatomy—in fact, he never lost the horror of blood which he afterwards always associated with them. The lectures on geology and zoology were so "incredibly dull" that he determined, a little rashly, never "to read a book on geology or in any way to study the science" so long as he lived. In spite of all this, he picked up a good deal of valuable knowledge at Edinburgh, though practically none of it came through the official channels of education. He made friends with fishermen and accompanied them when they trawled for oysters; he made a small discovery about a sea-worm, and read a paper about it to a learned society; and a negro taught him to stuff birds. His vacations were spent at home or with his Wedgwood cousins in North Wales, walking and shooting.

Dr. Darwin soon realized that his son would make as poor a doctor as he would a classical scholar, particularly as the boy found that he would have sufficient private means not to be obliged to practise; and he proposed that Charles should become a clergyman. The idea appealed to him, and after reading with great care *Pearson on the Creed* and a few other books on divinity, he decided that his religious opinions left nothing to be desired on the score of orthodoxy. He was much tickled, later in life, when he heard that a body of learned German phrenologists had publicly discussed the shape of his head, and found that he had "the bump of reverence developed enough for ten priests"; but, although now it may seem queer to reflect that a philosopher whose views have been as fiercely attacked by religious people as Darwin's were, and still are, himself nearly became an Anglican clergyman, it was by no means queer at the time. Shelley once had the same ambition, but with him it passed off rather more suddenly.

To become a clergyman it was necessary to take an English degree, and Darwin discovered to his dismay that in the short interval since he had received the blessings of a seven years' classical education at a good public school, he had forgotten almost everything he had learnt there. Three months' cramming, however, were sufficient to rub up his Greek alphabet, even his Homer, and he proceeded in his twentieth year to Christ's College, Cambridge.

Here, as far as academic studies were concerned, he wasted his time as completely as at Edinburgh and

at school. Surely no one was ever more the despair of pedagogues than this well-intentioned, gifted, and by no means idle young man! He was, as ever, full of interests: he collected butterflies, rode horses, shot birds in the fens, dined often with friends, played cards, heard music in King's Chapel, studied engravings at the Fitzwilliam Gallery, and struck up a warm and lasting friendship with Henslow, professor of botany, to whom till the end of his days he referred as "quite the most perfect man I ever met with." His love of music was genuine, and the "shiver down the spine" that it sometimes gave him is a not uncommon experience of musical natures. On one occasion, while listening to a fine anthem in King's Chapel, he turned to a friend and whispered: "How's your backbone?" But oddly enough, he had the greatest difficulty in recognizing tunes, and "God save the King" played through rather more quickly or slowly than usual by musical friends of an experimental turn of mind, was a "sore puzzle" to place.

His prime pursuit at Cambridge was the collecting of beetles, mainly for the sheer joy of capturing as many kinds as possible; he studied them little when he had caught them. He was prepared to go to almost any length of discomfort in this holy cause, as he illustrates in a story which he gives as "proof of my zeal: one day, on tearing off some old bark, I saw two rare beetles, and seized one in each hand; then I saw a third and new kind, which I could not bear to lose, so that I popped the one which I held in my right hand into my mouth. Alas! it ejected some

intensely acrid fluid, which burnt my tongue so that I was forced to spit the beetle out, which was lost, as was the third one." Apart from this pursuit he had a full social life, but found the prescribed book work as tedious as usual: the mathematics was "repugnant," and his attendance at classics lectures "nominal." He passed his B.A. examination without much difficulty, however, and kept a further two terms at Cambridge. He had so far forgotten his distaste for geology as to make friends with Professor Sedgwick, to whom Henslow had introduced him; and so eager was he to visit Teneriffe and its wonderful formations, that he actually made inquiries in London about ships sailing there.

It was after a geological holiday with Sedgwick in Wales that the chance occurred which determined the whole course of his life. A letter from Henslow told him that a certain Captain FitzRoy was willing to give up part of his own cabin to any young man who would volunteer to go with him without pay as naturalist in the *Beagle*, an Admiralty vessel which was to undertake survey work in distant parts of the world. Henslow had strongly recommended Darwin as "amply qualified for collecting, observing, and noting anything worthy to be noted in Natural History." Dr. Darwin was doubtful—as well he might be by this time—whether any good would come of it: the voyage might unfit Charles for a clergyman's life, he had little knowledge of the sea, the notice was short, he might not suit the captain; but he was willing to give his consent to the project

if his son could find "any man of common sense" who advised him to go. His uncle, Josiah Wedgwood, proved to be the man; the doctor's objections were answered in turn, and Charles was found suitable for the post.

He met FitzRoy and took an immediate liking to him. The next weeks were full of the bustle of preparation; breathless letters poured into his home from wherever he happened to be—"Tell Nancy [his old nurse] to make twelve instead of eight shirts." FitzRoy had recommended some pistols which were much too expensive—"I have procured a case of good strong pistols and an excellent rifle for £50, there is a saving." He dashed down to Plymouth to see the *Beagle*; he worked at astronomy; he found time to watch the coronation procession of William IV from a guinea seat, and noted the lack of invention in the decoration schemes and the lack of enthusiasm for His Majesty, so that "I can hardly think there will be a coronation this time fifty years." Excitement grew very tense as the day for sailing drew near. FitzRoy was all that a gallant captain should be—handsome, commanding, respected of his men. "Every now and then I have moments of glorious enthusiasm, when I think of the date and cocoa trees, the palms and ferns, so lofty and beautiful, everything new, everything sublime." At last he would see Teneriffe! "What a glorious day the fourth of November will be to me!" he wrote to his captain and host. "My second life will then commence." But it was weeks before the *Beagle* could

sail; twice she was driven back into harbour by heavy gales, and Darwin was in very low spirits. An eventful year in his life was coming to an end: in January he had come down from Cambridge as an undergraduate with scientific hobbies, and by the thirty-first of December the *Beagle* had left England and was already tossing in the Bay of Biscay, and Darwin was an official naturalist on a world voyage in an Admiralty vessel.

He had never formally renounced his plan of becoming a clergyman.

Chapter II: The Voyage of the Beagle

DARWIN's real education was this five years' voyage to the islands of the Atlantic, the South American coast, Tahiti, New Zealand, Australia, Mauritius, Brazil and the Azores. The *Beagle* was a solidly built vessel of 242 tons, rigged as a barque, and carrying two whale boats and seven brass guns; she belonged to the old type of ten-ton brig, affectionately nicknamed "coffins" because of their tendency to go down. But on this voyage the hundred-foot vessel carried safely enough her crew of seven officers, five under-officers, two surgeons, and a purser; a squad of ten marines, thirty-four seamen, six boys and two servants; an artist and an instrument maker; a missionary and three Fuegian savages whom Fitz-Roy was returning to their home; and Charles Darwin. Lightning conductors (a brand new

invention) were carried on all the masts, the bowsprits, and even the flying jib-boom; and, for accurate survey work, twenty-four chronometers were aboard.

The living quarters were cramped: Darwin had "just room to turn round, and that is all," and the narrow space at the end of the chart table was his only accommodation for working, dressing and sleeping. He was able to store the specimens that he collected in a very small cabin under the forecastle. To add to his discomfort, he suffered dreadfully from sea-sickness during practically the whole of the voyage.

He planned for himself a full life of investigation, research and study: he caught sea-specimens in a large bag made of bunting, slung by a cable from the stern of the ship, and would spend hours arranging, classifying and labelling them; and when the *Beagle* put into land, as she often did for weeks at a time, he would take his geological hammer and collecting cases, and walk or ride, alone or with a friend from the ship, on long expeditions inland. Most of the work at natural history was of little value to science, though of immense value to himself as training in observation. He had no skill in dissection, almost no skill in drawing, and a very shaky knowledge of anatomy. But with geology it was a very different matter: he found it "a capital science to begin with, as it requires nothing but a little reading, thinking, and hammering." He had brought with him the first volume of Lyell's *Principles of Geology*, which Henslow had recommended to

him as a splendid collection of facts, but warned him "on no account to accept the views therein advocated." In this book, the second volume of which was sent out to the enthusiastic and excited Darwin in South America, were put forward for the first time beliefs (now universal) about the vast gradual geological changes which have occurred on the earth; and it did much to prepare his mind for his own theories of the evolution, through immense periods of time, of all living things. Henslow had agreed to receive and take care of all his specimens, and from time to time he sent home packing cases, crates and pill-boxes full of precious labelled objects—rocks, snails, fossil bones, spiders, barnacles and the like—together with long letters on his scientific observations. On his return he was quite surprised to find that his name was well known in certain scientific circles; Henslow had read some of his letters to a learned society, and had printed them for private distribution. It seems only gradually to have dawned on Darwin that he might write something which people would care to read—he had not expected to do more than help the "real geologists" by careful collection and observation. The first vague notion of a book on the geology of the various countries visited made him "thrill with delight," and when FitzRoy heard him read some of his *Journal on the voyage*, and declared that it would be worth publishing, he was overjoyed.

He describes his manner of life at sea in a letter to his sister: "When the weather is calm, I work at

marine animals, with which the whole ocean abounds. If there is any sea up I am either sick or contrive to read some voyage or travels." He made firm friends with FitzRoy, and grew to respect him, in spite of his political opinions—for FitzRoy was a staunch Tory. They had many an argument about slavery, which, to Darwin's horror, the captain defended. They agreed about hardly anything; FitzRoy believed in the literal accuracy of the Book of Genesis, and was afterwards very indignant with Darwin for publishing so wicked a book as *The Origin of Species*. But the two men, the Tory and the Whig, the violent and the gentle, the believer and the sceptic, got on very well with each other in their tiny cabin, and Darwin long afterwards referred to his character as "in several respects one of the most noble which I have ever known."

Throughout the voyage Darwin kept a private diary, much of which he incorporated in his later published Journal. One of the most striking things about it is the evidence of his continual zest and enjoyment. It is usual, probably, to think of Darwin as a bearded sage in a cloak, with deep melancholy eyes; but the Darwin of the *Beagle* is no less the essential man—active, athletic, sociable, taking considerable physical discomforts with unfailing humour, in a constant state of exhilaration at the wonders and delights of the voyage, and never losing all the while his warm affection for things and people at home—"it is too delightful to think that I shall see the leaves fall and hear the robin sing next autumn at

Shrewsbury. . . . I doubt whether ever boy longed for his holidays as much as I do to see you all again."

He missed many of the pleasures of home life deeply—music and pictures as well as the companionship of friends. "After so long a fast, the appetite for music becomes very keen," he wrote, and he heard a Rossini opera at Buenos Aires, and some Mozart played by the band of a British man-of-war, with especial pleasure. Books he had with him, and would often take a Milton ashore on his geologizing expeditions.

He gives a thrilling account of an earthquake experienced in Chili, where the motion of the earth is "like that felt by a person skating over thin ice, which bends under the weight of his body. A bad earthquake at once destroys the oldest associations; the world, the very emblem of all that is solid, has moved beneath our feet like a crust over a fluid." He saw the town of Concepcion in utter ruins, and was torn between pity for the stricken inhabitants and excitement at such an interesting geological occurrence.

A strong feature of Darwin's character that emerges from his diary is his abhorrence of slavery. He can never witness it, and scarcely even think of it, without an expression of disgust. He will not hear of comfortable arguments (the sort that are sometimes used even to-day about the unemployed or the poor) that they "get used to it," that their misery is exaggerated. He looks forward to the eventual freedom of the slaves—"I hope the day will come

when they will assert their own rights"—and prophesies a great future for the negro race in America. It is the one subject on which he can hardly trust himself to talk with the good FitzRoy: "I would not be a Tory, if it was merely on account of their cold hearts about that scandal to Christian nations—Slavery"; and he asks anxiously for news from home about the growing agitation against slave-owning. It was one of his few political interests. He dislikes the Brazilians, and is shocked by their cruelty and corruption: they "possess but a small share of those qualities which give dignity to mankind. Ignorant, cowardly, and indolent in the extreme . . . they answer all questions by asking 'why cannot we do as our grandfathers before us did?'" Near Rio de Janeiro he lived opposite an old lady who kept screws to crush the fingers of her female slaves; he tells some terrible stories of the cruelties that he personally witnessed, and when the *Beagle* finally sailed, he writes fervently: "I thank God I shall never again visit a slave country." He saw something also of a bloody revolution, and writes sternly of the "imbecile changes" that it was designed to bring about. To the end of his life cruelty in any form moved him to deep indignation.

Perhaps the thing that made the greatest impression on his mind during the whole voyage—greater even than his geological finds—was his first sight of savages. On a previous voyage FitzRoy had seized three Fuegians as hostages, brought them to England and had them educated, characteristically at

his own expense, in a London suburb. They went by the delightful names of York Minster, Jemmy Button and Fuegia Basket. He was now returning them to their home, armed with a load of books and numerous sets of crockery which a thoughtful missionary society had provided. Darwin was appalled by the primitiveness of the natives whom they were rejoining, and could scarcely feel that they were human: they were naked, filthy, stunted in growth, and hideously daubed with paint, without manual skill or apparent power of reflection. They proved friendly on the whole, but they were, Darwin writes, "such thieves & so bold cannabals [*sic*] that one naturally prefers separate quarters." Again and again he is astonished at the distance that separates savages from civilized people, and it is easy to trace in these experiences a train of thought which is prominent in his later writings on the descent of man. The people of Tahiti, on the other hand, he admired for their beauty, intelligence and hospitality—those were the idyllic days of the South Sea islanders before the trader and the whisky merchant and the exploiter had begun to ruin a fine race; and he says a good word for the missionaries, whom it was fashionable to blame for everything that went wrong with a primitive people, remarking upon their kindliness and giving them credit for doing a great deal—"they expect the Missionaries to effect what the very Apostles failed to do."

On the return voyage he sums up the pleasure and pains of travelling, and finds it good. The lack of

room, the sense of hurry, the loss of loved society, are undeniable evils; and "if a person suffer much from sea sickness, let him weigh it heavily in the balance." The sea, as such, he feels to be overrated: "What are the boasted glories of the illimitable ocean? A tedious waste, a desert of water. . . ." But all this is far outweighed by the loveliness of natural scenery—though "the traveller should be a botanist, for in all views plants form the chief embellishment"—the sight of savage peoples, of glaciers, lagoon islands and active volcanoes, and above all the pleasure of living in the open air, with the sky for a roof and the ground for a table—the escape from a dull "civilized" round of life. In travelling, a man discovers "how many truly goodnatured people there are, with whom he never before had, nor ever again will have, any further communication, yet who are ready to offer him the most disinterested assistance."

The *Beagle* came to anchor at Falmouth five years and two days after Darwin had left his father's house, and he left by the mail that same night for Shrewsbury. He never set foot outside his country again.

Chapter III: Early Writings

THE next few months were very busy: there were old friends to be revisited, specimens to be sorted, scientific articles to be written. The Darwin who now settled down to work—it proved to be a life's work—

at solving all the problems which his voyage had raised, was a different man in some ways from the enthusiastic naturalist who had sailed from Plymouth in the *Beagle*. He was twenty-seven years old, conscious of his powers, and he had learnt a good deal about human beings as well as about the rest of the natural world. He is described as "a rather tall and rather broad-shouldered man, with a slight stoop, an agreeable and animated expression when talking, beetle brows, and a hollow but mellow voice"; and his greeting of an old acquaintance was "sailorlike—that is, delightfully frank and cordial."

He settled for a while at lodgings in Cambridge, where all his collections were, and spent three months having his rocks and minerals examined. He was still conscious that he knew very little about many branches of natural history: "someone seemed quite surprised that I knew nothing about a *Carex* from I do not know where. I was at last forced to plead most entire innocence, and that I knew no more about the plants which I had collected than the man in the moon." Besides trying to dispose of his collection with various museums, he had his Journal to work at, and he supervised the publication of the official *Zoology of the Voyage of H.M.S. Beagle*, in five massive volumes, to which the Chancellor of the Exchequer made a grant of £1,000. At this time he became very friendly with Lyell, whose *Geology* had made such an impression on him—indeed, he used to say afterwards that, but for that book, *The Origin of Species* might never have been

written. The great geologist encouraged him in his theories, and in the preparation of a paper about coral reefs.

Two of the most important steps of his life were taken about this time. "In July opened first note-book on Transmutation of Species"—a note-book that was to record a series of investigations lasting over twenty-two years, and shake the thought of the world. And in the next year he married his cousin Emma, daughter of the Josiah Wedgwood on whose advice he had sailed in the *Beagle*. The marriage was a very happy one, and they were well suited to each other. "There never was anyone so lucky as I have been," Darwin wrote to her, "or so good as you"; he even forgot his coral reefs, and hoped that Emma would soon teach him "there is greater happiness than building theories and accumulating facts in silence and solitude." Emma's one fear was that Charles "has a great dislike to going to the play, so that I am afraid we shall have some domestic dissensions on that head. On the other hand he stands concerts very well. . . ." Charles began well and dutifully by himself suggesting a visit to the theatre, though Emma tells her aunt that she is "afraid it was only a little showing off. It was *The Tempest*, and we all thought it very tiresome."

That point settled, Darwin could turn to his scientific labours. He should have been a very happy man: he had a loving wife, good friends, work of absorbing interest, and time and money to devote to it. But from now on his health began to suffer.

During the first three years of his married life he was constantly ill, and at the age of thirty-two he wrote very gloomily to a friend about his future prospects: "My father scarcely seems to expect that I shall become strong for some years; it has been a bitter mortification for me to digest the conclusion that 'the race is for the strong,' and that I shall probably do little more, but be content to admire the strides others make in science." Do little more! The next forty years were to be packed full of experiments and investigations, which were to alter the nature of a dozen sciences.

It seemed useless to go on living in London—only in a secluded country house could he get the rest and quiet that his physical weakness demanded. He searched everywhere for a suitable home, and at last found, more as a result of despair than preference, a house about sixteen miles from London, in the little village of Downe in Kent, where he came with his wife and two children. It was then a ten miles' coach drive from the nearest railway station, and even now is curiously remote, away from any railway or bus route. He was half ashamed to bury himself in the country in this way: "I hope by going up to town for a night every fortnight or three weeks, to keep up my communication with scientific men, and so not to turn into a complete Kentish hog." The village is still small and sleepy, and Darwin's house and garden are still very much as they were nearly a hundred years ago. Down House itself was acquired for the nation by a benefaction in 1929, and

is maintained as a Darwin memorial, which may be freely visited at any time. Darwin's study is almost exactly as he knew it, filled with his own furniture, specimens, books and papers—even his beloved terrier, Polly, curled in a basket by the fireside. He knew that he had dropped anchor: "My life goes on like clockwork," he wrote to FitzRoy, "and I am fixed on the spot where I shall end it." In this peaceful country house he lived and thought and worked for forty years; in the first whole twelve years after he settled there he was away from home for only sixty weeks. Here his family grew up, a happy, gifted and extraordinarily self-contained community.

He had something of a name already as the author of two books, the *Journal of Researches* (sometimes called *A Naturalist's Voyage round the World*) which he had compiled from his *Beagle* diaries, and *Coral Reefs*. He had spent much time and pains on the theory of coral lagoons, read every existing work on the islands of the Pacific, and consulted numerous charts. He was absurdly modest about it—indeed, to the end of his life he seems to have thought it strange that he could be right: "If I am wrong," he wrote years later about this very subject, "the sooner I am knocked on the head and annihilated so much the better." The book is a classic as an example of scientific method, and if Darwin had never written anything else, this treatise alone would have given him a place in the front rank of scientific investigators. He approached the problem of how coral reefs were formed by thinking out a theory before he had

ever seen a true coral reef, and he then verified the theory by examination of actual reefs. The theory itself is perhaps of no great interest except to geologists, but it may be briefly explained, since it was Darwin's first big contribution to scientific knowledge. The problem to be solved was, why do cone-shaped coral reefs spring up so steeply from great depths of ocean, and why do they uniformly rise only a few feet above the level of the waves? Geologists knew of nothing but volcanoes that could form such cones, and the tops of the cones were certainly the skeletons of minute sea-creatures; so it seemed that coral had begun to grow on the top of old submerged volcanoes, and gone on building till it reached the surface. Darwin was the first human being to wonder how deep the coral animals could live; he investigated, and found that they cannot build at a depth greater than a hundred and fifty feet. Here was a very pretty problem: how was the gap to be bridged? The course of his researches is too long to describe, but he finally proved that the foundation on which the coral built must have sunk gradually while the creature worked, always just keeping its head above water, as it were, until the coral layer might be many hundreds of feet thick. The question whether a small marine creature deposits its corpse a few yards higher up or lower down, may not seem perhaps of earth-shaking importance; nor is it. What is important in Darwin's work is his restless pursuit of true facts, until he can establish them beyond reasonable doubt. Actually, his theory has since

been found not to apply to all coral formations; but it has permanently affected the science of geology.

He published at about this time two further works, also based upon his *Beagle* investigations: *Volcanic Islands* and *Geological Observations upon South America*. Their main importance is technical, and they are chiefly of interest to the geologist.

He now settled down to the immense labour of a book on barnacles, a subject which had originally attracted him during the *Beagle* voyage. It cost him eight years' solid work, in which he attended to little else. The idea of spending eight years of one's life on describing one small sea creature is so remote from most people's experience or desire, that it may easily be made to sound comical. Darwin saw the humour of the situation, and suffered from constant sickness, and groaned, and went quietly on with his work. The reader shall be spared an exhaustive account of this eight years' study; in later life Darwin used to doubt whether the work had been worth the expense of so much time, but it gave him the right to speak as a specialist, and it is certain that a man who knows one subject thoroughly knows very much more besides. His great treatise, when it was finally published, was not only a final statement on the subject, but evidence of an astonishing piece of self-discipline. Darwin at Cambridge had been a mere collector; in the *Beagle*, a collector and observer; he was now a highly trained naturalist. To his children it must have appeared that barnacles were part of the ordinary routine of any normally

conducted family: one of them, hearing of a neighbour who was sometimes idle during the morning, asked in astonishment: "But when does Mr. Blank do his barnacles?" Darwin himself often grew weary of the subject: in the sixth year of his task he wrote: "I hate a barnacle as no man ever did before." They were difficult years in many ways: he writes [1845] "I believe I have not had one whole day, or rather night, without my stomach having been greatly disordered, during the last three years"; [1847] "at present I am suffering from four boils and swellings, one of which hardly allows me the use of my right arm"; [1849] "my poor dear father died. . . . I was at the time so unwell that I was unable to travel, which added to my misery"; two years later his ten-year-old daughter Annie died, and both parents were prostrated with grief. Darwin expressed his feelings on paper in words that are too intimate and pathetic to quote.

There is a portrait of him at about this period; he was now forty-five years old, and had lost some of the high spirits of the young naturalist of the *Beagle*. He was still clean shaven, but now wore luxuriant side-whiskers, and his heavy overhanging brows gave him a thoughtful, "beetling" expression. The top of his head was hairless, and showed his great domed forehead to its full advantage. His tightly closed mouth shows the effect of years of bodily pain.

At last the barnacles were finished with, and he turned to his notes on species. For nearly twenty years he had been collecting every fact which had

any possible bearing upon the subject. The problem to be solved was: Do species of living creatures really change, become modified, and if so, why? The general belief at this time was that animals and plants were created such as they are, and that their distribution over the world had been caused by the wanderings of their ancestors from the neighbourhood of Mesopotamia after the Flood. Anyone who felt unsatisfied with this fashionable doctrine was at liberty to believe one of two things: that each species had simply happened, sprung into life suddenly, each in its own home; or that existing species had descended from other species, and become gradually modified. But why should modification occur? It was obvious that man could "select" certain types of domestic animals, and so alter the character of a breed: from curs he could produce bulldogs and greyhounds to be his servants and companions, and could change wild grasses into wholesome wheat for his very means of subsistence; but how selection could be applied to organisms living in a state of Nature remained a mystery. The key to the mystery was furnished by an essay *On Population* by Thomas Malthus, an English clergyman of saintly life, which Darwin had accidentally picked up in the year of his marriage. The theme of the essay is, roughly, that man multiplies more quickly than does his supply of food, therefore there is competition for the means of existence; the success of one competitor involves the failure of others—that is, their extinction, for the prize for which they struggle

is life itself; and the victor is the man who is best adapted to the conditions of competition. There is, in fact, a "struggle for existence." If, therefore, Darwin could show that favourable variations in a family of living creatures would tend to be preserved, and unfavourable ones to be destroyed, he could show how new species came into being. It was by no means as simple as that: there were any number of theories to be tested, and any number of difficulties to be met; but he had the clue for which he was looking, and Lyell encouraged him to write his conclusions in a book. He worked hard for the next four years, and the harder he worked the vaster the subject seemed to become—"Sometimes I fear I shall break down," he wrote. He made arrangements, in case of his sudden death, for his notes to be published: "If, as I believe, my theory in time be accepted even by one competent judge, it will be a considerable step in science."

He had written nearly half the book when his work received a shattering blow. A young naturalist named Alfred Russel Wallace, engaged in collecting birds in the East Indies, sent him a short essay "on the tendency of varieties to depart indefinitely from the original type," which might have been an abstract of his own theory, so closely did it agree. He had been forestalled, and the labour of twenty years had apparently been in vain. He was very ill at the time; his infant son had died on the previous day, and a daughter was ill with diphtheria. Darwin's first thought was to secure recognition for his obscure

young colleague, and to have the paper published; he was ashamed at minding at all that a prize had been snatched from his grasp—"It is miserable of me to care at all about priority. . . ." It was a curious situation: with two lesser men there might have been a scramble for fame, and constant wrangling between rival scientific parties. As it was, it is difficult to decide which of the two men showed himself the nobler. When *The Origin of Species* was published, Wallace wrote: "I could never have approached the completeness of his book, its vast accumulation of evidence, its overwhelming argument, and its admirable tone and spirit. I really feel thankful that it has not been left to me to give the theory to the world." Darwin on his side would have quietly let Wallace's essay hold the field, had not Lyell urged him to publish a boiled-down version of his uncompleted book. It is true that Wallace would have made a poor leader in the struggle ahead: he was not a reliable reasoner, and had not the endurance for prolonged research. But he had a fine and generous disposition, and rightly shares Darwin's honour. He became a firm friend of Darwin, published many books on zoology and social subjects, and eventually died in 1913, aged ninety.

The great book was never written. What we know as the *Origin* is a *résumé* of it, which Darwin made during "thirteen months and ten days' hard labour." A joint paper by the two pioneers of a new theory of evolution was read before a learned society, and caused some excitement but very little discussion.

Meanwhile the book *On the Origin of Species by means of Natural Selection, or the preservation of favoured races in the struggle for life*, to give it its full title, was nearly ready. When Darwin sent it to the publisher he wrote: "It may be conceit, but I believe the subject will interest the public. . . . If you think otherwise, I must repeat my request that you will freely reject my work; and though I shall be a little disappointed, I shall be in no way injured." In these modest terms he spoke of a book that has permanently influenced the thought of the human race. It appeared towards the end of 1859, when Darwin was fifty years old, and every single copy printed was sold on the day of publication.

Chapter IV : The Theory of Evolution

TEN years after *The Origin of Species* was published, the poet Matthew Arnold was talking with a scientist, and said: "I cannot understand why you scientific people make such a fuss about Darwin. Why it's all in Lucretius!" The scientist answered: "Yes! Lucretius guessed what Darwin proved," and Arnold replied mischievously: "Ah! that only shows how much greater Lucretius really was—for he divined a truth, which Darwin spent a life of labour in groping for." It is true: the poet did guess the secret of evolution in a flash of insight, as many poets and philosophers did before and after him; and the scientist did grope, as no man had ever done

before. Poet and scientist finally reached the same truth, but by different methods; and perhaps the method of each is essential, in the end, for a proper understanding of the truth.

The Darwinian theory of evolution is a tangled subject. It should be sufficient to say: "Read *The Origin of Species*, and you will see what it is all about"; but the thing is not quite so simple as that. To start with, it is a very deceptive book: it looks straightforward, almost conversational, but proves to be, as Darwin himself said, "one long argument," which needs very close following. The style is apparently simple and non-technical, but every now and again one has to stop in the middle of a paragraph and start again at the beginning to be quite clear what he is saying. Whether for these reasons or not, few books have been so widely or so persistently misunderstood. It was immediately popular, because it raised a whole number of points of philosophy and theology which any intelligent person would be certain to find interesting; and because, incidentally, it contained a wealth of curious information about natural history, and described ingenious experiments which flatter the reader into supposing that he is something of a *savant*, since they seem quite easy to follow. But apart from the complexity of the subject, there is another barrier which stands between this book and the modern reader: the crust of legend that now surrounds Darwin and his theory, and the echoes of the quarrels that it aroused. It is still possible, for instance, to read in newspaper

articles that Darwin invented the idea of evolution, and that organized religion was bitterly opposed to it—that a war to the death was waged between Science and Faith. There was never greater nonsense spoken. There was, indeed, a conflict between scientists and religious men during the last century, but all the scientists did not find themselves on one side, nor all the religious men on the other: it was a general conflict, and it is still going on, for the reason that the abstract “scientific man” and the pure “religious man” do not in fact exist.

The idea that species of living things are fixed and unchangeable is not a Christian idea at all. The literal interpretation of the creation story in Genesis, such as we find, for instance, beautifully but rather absurdly illustrated in Milton's *Paradise Lost*, is not much older than Milton. It was not the teaching of the early Christian Church. It first appears definitely in the seventeenth century, not as a religious idea, but as a purely scientific conclusion, from evidence about the limits within which inter-breeding was possible. (Different species of animals cannot combine to produce mongrel offspring; therefore they are “set,” and cannot be altered by the introduction of new blood; therefore they are fixed types, and must always have been so. It was a bad argument, but that is roughly how it ran.) It first became a real scientific dogma in the writings of the great Swedish botanist Linnæus (1751), who wrote: “There are as many different species as the Infinite Being originally created different forms.” When Darwin wrote to a

friend that it was "like confessing a murder, to confess to the opinion that species are not immutable," he was thinking of scientific, not of religious opposition. If Darwin had published his theory of evolution in, say, the fourth century A.D., among the Christian thinkers brought up on Greek philosophy, he would have produced no shock. Aristotle, the great naturalist (among other things) who died three hundred years before Christ, had recognized the processes of change that go on in Nature, and the kinship between apparently very different creatures—he rightly classifies, for instance, whales with mammals instead of fishes, and bats with mammals instead of birds. The early Christian Church was quite accustomed to looking upon Genesis as allegory: St. Augustine held that God had in the beginning created only germs or causes of the forms of life, which were afterwards to be developed in gradual course—which is almost in so many words the contents of the last paragraph of *The Origin of Species*. (This, of course, is not to say that these early Christian thinkers themselves "discovered" evolution—a quite preposterous claim which some people have tried to make for them.)

Philosophers all through the centuries, the Roman poet Lucretius, already mentioned, Leonardo da Vinci (whose note-books make so many modern "inventions" sound stale), the Frenchman Descartes, the Portuguese Jew Spinoza, the German Leibnitz—these and others were familiar with the idea of evolution. The poet Goethe, greatest of the

German race, can fairly be called an evolutionist. All these men, it is true, were thinkers rather than naturalists; but the author of the *Histoire Naturelle* (1750), the brilliant French amateur Buffon, upheld the same ideas. Erasmus Darwin throws out many hints of it in his *Zoonomia*—the law of living things. Buffon thought that evolution, which he calls “the alteration and degeneration of animals,” was due solely to the effect on an animal of its surroundings. Erasmus Darwin attributed it to the efforts of the animal to get used to the surroundings, and so to learn new habits, and so to produce bodily changes. (It is a curious fact that although Darwin read his grandfather’s works in boyhood, they seem to have made very little impression on him.) The Frenchman Lamarck took up the tale, and in the year of Darwin’s birth wrote a book which is full of evolutionary theory. He relies upon conjecture rather than experiment: the whole book is a mass of amazing guesses, and he had the faculty of often guessing right. Lamarck emphasized the great importance played by the use and disuse of particular limbs or organs, to meet different situations; continual use might even cause a new limb to grow gradually, and continual disuse cause it to disappear in the course of many generations—always supposing that each little change could be passed on to the offspring. According to Lamarck, changes in living creatures occur because they consciously and intelligently adapt their bodies to meet new situations. But it was one thing to say that the development of a

bodily organ, such as the elephant's trunk, results from an animal's feeling a new want; and quite another thing to say that what one individual acquires in the course of its life is handed on to its offspring, so that the new generation does not need, as it were, to "start from scratch." Unless the second belief is true, the first is useless as an explanation; the "inheritance of acquired characteristics," as this second belief is called, is still a matter of fierce dispute, but it is now generally held to be proved that, with possible rare exceptions, it does not occur.

It might seem as if, by now, Darwin had been stripped of all the credit for a great scientific discovery. On the contrary, he deserves all the greater credit for refusing to accept all the hints, guesses, hypotheses, half-carried-out experiments and faulty reasoning of the hundred-and-one evolutionists who had preceded him, and for setting himself to work at the problem from the very beginning. In point of fact, he knew very little about anyone else's theories of evolution until he had been at work for many years. At the time when the *Beagle* was sailing the seas, the theory had sunk very low indeed in the estimation of all naturalists; no leading scientist had any patience with it, no students thought of wasting their time over it. So far as we know, when Darwin began to puzzle over the facts collected in his notebooks in 1854, he was the only man in the world who seriously believed that one species could be modified to form another. He himself writes: "It has sometimes

been said that the success of the *Origin* proved 'that the subject was in the air,' or 'that men's minds were prepared for it.' I do not think that this is strictly true, for I occasionally sounded not a few naturalists, and never happened to come across a single one who seemed to doubt about the permanence of species. . . . I tried once or twice to explain to able men what I meant by Natural Selection, but signally failed." What probably was true, was that all naturalists were in possession of all sorts of facts, which would immediately fall into place and become intelligible the moment a certain theory was properly explained and found to cover them. How did Darwin succeed in creating such an intense interest in the subject, and in winning over the whole world of thinking people to the general idea of evolution? He succeeded, primarily, because he knew his facts: he had doggedly collected and classified every known fact which he had come across for twenty years, that bore upon the subject. He succeeded because his arguments were good: direct demonstration was out of the question, but what a clear and logical line of reasoning could do, Darwin's reasoning did. He succeeded because he produced a theory to account for the easily demonstrated fact of change, which men found they could accept. The theory of natural selection is not an established fact: it is still only a theory, but it has the hallmarks of a good theory—it interprets known facts in very varied cases, it is useful as an instrument of research, and it has been used to predict results successfully. He

succeeded, finally, because his sincerity was of such a kind that men had to listen to him.

It is important to remember the two sides of Darwin's work: the establishing beyond doubt, for the first time in the history of human thought, of the fact of evolution; and the putting forward of a theory to account for that fact. The two things are often confused; and when it is sometimes said (quite truly) that nowadays many scientists refuse to accept Darwinism, ill-informed people wrongly suppose that it is the idea of evolution itself which is rejected. It hardly needed Darwin to show that evolution does occur throughout the whole natural world—the evidence, centuries old, was there in abundance; but he did, by his patient collection of the evidence, in fact settle that question for good. "Darwinism" proper, on the other hand—the theory of natural selection—really was his own invention.

His argument is as follows. All living creatures multiply so fast that unless the greater part of each generation perished without leaving offspring, the world would rapidly become choked with them. (It is reckoned, for instance, that a female cod-fish lays about 9,000,000 eggs a year. If all these little cod-fish grew up and all the females produced families at the same rate, unhindered, in a very few years the sea would be a solid lump of cod.) But in actual fact, animal and plant populations are, roughly speaking, stationary. So there must be, within each species and between the different species, a continual state of competition for the means to life;

and the penalty for defeat is death. If a few members of a species differ from their fellows (how they come to differ does not matter for the moment, though it is obviously an extremely important point) in any way which gives them an advantage in this competition for livelihood, they are more likely to survive. They are therefore more likely to have offspring, and a fair proportion of their descendants, though not necessarily all, are likely to inherit the advantage. To give the often quoted example, Lamarck thought that the giraffe's neck had grown long as the result of many giraffes stretching up to reach high branches, each generation handing on a slightly bigger stretch to the next. But the trouble about all this "wanting" of things to alter is that it obviously cannot apply to plants, which must equally be brought into the evolutionary scheme. According to Darwin's theory, those giraffes which from birth had rather longer necks than their fellows were less likely to starve (some must starve, when all the lower branches of trees had been stripped of food, since there is not room for all), and so would leave descendants who were likely to resemble them; of these, the longest-necked ones were most likely to grow up, and so to leave descendants—and so on. Thus the giraffe family would develop its neck until there was nothing to be gained by developing it further; and then some other weeding-out process might begin. Darwin produces three sorts of evidence to support his theory: first, he shows that new species can apparently be started by man's artificial selection

(consider the difference between the appearance of the race-horse and the cart-horse, the greyhound and the dachshund—animals bred by man for special purposes); secondly, he shows that the conditions of wild life are quite enough to exert a similar kind of selection in the natural world; thirdly, he shows that all the strange facts of the way in which different sorts of animals live in different parts of the world, the development of all kinds of creatures with special faculties, can be explained by this means. The exciting conclusion was, of course, that all animals were related, in the sense that all had sprung from a very few—perhaps from one lowly ancestor. The still more exciting implication was that Man himself was one of the family. But Darwin—though characteristically he dropped a hint of what was to come, "in order that no honourable man should accuse me of concealing my views"—was lying low about that for a little while.

Chapter V: "The Origin of Species"

It is said that Darwin wrote *The Origin of Species* with the air of a man who, although himself convinced, hardly hopes to convince anybody else. The same strain of almost unnatural modesty runs through many of his books—for it is modesty, not genuine uncertainty about what he is saying. While the book was being prepared, he wrote to a friend: "I think I have found out (here's presumption!) the simple

way by which species become exquisitely adapted to various ends. You will groan, and think to yourself 'On what a man have I been wasting my time and writing to.'” He sent copies to many leading scientists, at home and abroad, accompanied by charming diffident letters of apology for bothering them. A single example will suffice: “If, after reading my book, you are able to come to a conclusion in any degree definite, will you think me very unreasonable in asking you to let me hear from you. . . . Though I, of course, believe in the truth of my own doctrine, I suspect that no belief is vivid until shared by others. . . . When I think of the many cases of men who have studied one subject for years, and have persuaded themselves of the truth of the foolishness of doctrines, I feel sometimes a little frightened, whether I may not be one of those monomaniacs. Again pray excuse this, I fear, unreasonable request. A short note would suffice, and I could bear a hostile verdict, and shall have to bear many a one.” It is quite an effort to remember that a letter such as this was accompanying, not an amateur's pamphlet on some crack-brained theory, but one of the noblest scientific books that have ever been written, the conclusions of a learned and highly qualified naturalist. He wrote dozens of letters during the first six months after the book was published, and implored his readers only to take time, to give the new views a fair chance. “If you come round ever so little,” or “If you are in the least staggered,” are the kind of phrases that recur. The

newspaper reviews were for the most part bitter and hostile. Darwin was a "flighty" person endeavouring to "prop up his utterly rotten fabric of guess and speculation," and his "mode of dealing with nature" was "utterly dishonourable to Natural Science" (this was written by a bishop who knew very little about natural science, but on the strength of a good mathematical degree wielded a wide influence as a critic of such things). Again, he was humorously asked: "Is it credible that all favourable varieties of turnips are tending to become men?" Darwin bore all this misunderstanding, ridicule and downright rudeness quite calmly; he never once forsook the dignity of silence to answer back. Later in life this extraordinary man could write: "On the whole I do not doubt that my works have been over and over again greatly overpraised. . . . Whenever I have found out that I have blundered, or that my work has been imperfect, and when I have been contemptuously criticized . . . it has been my greatest comfort to say hundreds of times to myself that 'I have worked as hard and as well as I could, and no man can do more than this.'" His silence meant simply one thing: this theory can only be disproved by adverse facts—what facts have you got? The enemies of the theory had none; the most they could do (and certainly it was quite enough!) was to unite in condemning the book as irreligious. This gave Darwin particular distress: "I am bewildered. I had no intention to write atheistically. But I own that I cannot see as plainly

as others do, and as I should wish to do, evidence of design and beneficence on all sides of us. . . .”

There were a few scientists who supported him, chief among whom was T. H. Huxley (grandfather of the scientist Julian and the writer Aldous). He was a man of extraordinary intellect, of generous character, of unflinching loyalty to what he found as the truth, and he liked a scrap; yet he knew how to be discreet. He was a good tactician, and when by a fortunate chance *The Times* editor gave him the book to review, he delivered no hammer blows at the scientific enemy, but wrote gently, with subtle persuasion. He had his reward on the occasion of the British Association meeting at Oxford, when a chance came to hit out; and he took it. Bishop Wilberforce (“Soapy Sam,” his nickname, will do as well as any more elaborate character sketch) had announced that he intended “to smash Darwin.” There was an intensely excited audience of nearly a thousand people, scientists, clergy, undergraduates, members of the public—and a certain Admiral Fitz-Roy. After some preliminary skirmishing bouts, in which the absent Darwin was subjected to a little shadow-boxing, the Bishop rose, and after “spouting for half an hour with inimitable spirit, ugliness, and emptiness and unfairness,” descended to a piece of sheer vulgarity and asked “Professor Huxley, who is sitting by me . . . as to his belief in being descended from an ape. Is it on his grandfather’s or his grandmother’s side that the ape ancestry comes in?” The room rocked with laughter, and Huxley

said exultingly to his neighbour: "The Lord hath delivered him into my hands." The audience shouted for Huxley, but he waited his time. When it came he was in no hurry, and spoke quietly and slowly: "I asserted—and I repeat—that a man has no reason to be ashamed of having an ape for his grandfather. If there were an ancestor whom I should feel shame in recalling, it would be a man"—he paused, and probably by this time his audience knew what was coming—"a man of restless and versatile intellect who, not content with success in his own sphere of activity, plunges into scientific questions"—the rest of his sentence was drowned in a roar of applause.

Much of the misunderstanding of Darwin's theory has been due to his use of certain phrases. "Natural selection" itself proved a stumbling-block, and Darwin used to say that if he had to rewrite his book he would use the phrase "natural preservation" or "naturally preserved." "Selection" sounded to many people as if some goddess of Nature consciously selected the breed that was to succeed; but Darwin pointed out that no one ever objected to agriculturalists using the strongest language about "their" selection, yet every breeder knew that he did not himself produce the modifications which he selected. In any case, Darwin never claimed that it was the only influence at work; he claimed that it had been the main, though not the sole, means of modification; but for years he was attacked for saying what he had never said. As usual, he blamed himself for

the misunderstanding, and thought he must have expressed his meaning badly. He was attacked, too, for attributing all evolution to "chance" variations; but he had explained most carefully in the *Origin* that he used "chance" in the strictest and properest scientific sense of "having an unknown cause"—and nobody else has ever discovered a cause why all members of a family are not exactly alike. Again, the phrase "struggle for existence" gave trouble: it sounded like a single stampede of a large number of creatures trying to get through a small door, but of course it was nothing of the sort. Darwin said that he used it "in a large and metaphorical sense," and that it was often a very complex affair. For example, red clover depends for its fertilization upon humble bees; these are attacked and eaten by field mice; and field mice are devoured by cats—hence no bees, no clover, and the more cats, the more clover. Darwin himself admitted in the *Origin* the "staggering difficulties" of the theory of natural selection; but to discuss them would be to turn this book into a biological text-book. They raise all kinds of fascinating problems which are still awaiting their solution. The difficulties on which he lays chief stress are: why, if species have descended gradually from other species, do we not see everywhere the transitional forms—creatures that are half one thing and well on the way to becoming another; how can an extremely complicated organ like, say, the human eye, have been produced gradually; how can instincts be acquired and modified through natural

selection; how do we account for the fact that when species are crossed they are barren or produce barren offspring, whereas when varieties of the same species are crossed, their power of breeding is not affected?

Perhaps the greatest harm to the theory has been done by people who extract from it an easy optimism and a belief in continual progress. Darwin was himself an optimist; but it is very clear that going forward is not necessarily the same as getting better—it depends on what is beyond the "forward." Muddle-headed Darwinians sometimes say that man is getting more complex and therefore "higher"; he will go on getting more and more complex, and more and more sublime, apparently, for ever and a day. But some of Nature's most successful experiments (if to survive is to succeed—and that is the only test which Darwinism can fairly apply) have become more and more simple: language, for instance, becomes simpler as it evolves; men are less specialized in many ways than apes; the complicated giants of Conan Doyle's *Lost World* have disappeared, and the simple little tape-worm remains. Can the human race be solemnly said to have got "better"? Really it is useless to argue such a thing: the point is that the words "good" and "bad" have no business to be brought into a discussion of Darwinism. The only test for Darwinism is the success of whatever happens to survive, without any regard to its character.

Chapter VI: Life at Downe

It is time to turn for a moment from the battleground of scientific controversy to a quiet village far behind the lines, where Darwin lived, a good husband, a proud father and a devoted research-worker, removed from the turmoil that his theories were causing in the outside world. The greater part of the following description of Darwin in his later years is taken—often word for word—from a memoir written by one of his sons, which for vividness and interest cannot be improved upon.

His wife Emma was a quiet, patient, sincerely religious person, a regular church-goer with definite beliefs, who read the Bible with her children. At one time it seems to have distressed her that her husband did not share her faith ; but he would never have spoken against her religion—or anybody's—for it was not in him to wish to undermine beliefs which resulted in goodness. One of her sons writes of Mrs. Darwin: " For all the latter years of his life she never left him for a night, and her days were so planned that all his resting hours might be shared with her. She shielded him from every avoidable annoyance, and omitted nothing that might save him trouble, or prevent him becoming overtired, or that might alleviate the many discomforts of his ill-health. It is, I repeat, a principle feature of his life, that for nearly forty years he never knew one day of the health of ordinary men, and that thus his life was one long

struggle against the weariness and strain of sickness. And this cannot be told without speaking of the one condition which enabled him to bear the strain and fight out the struggle to the end." Emma's nature was simple and candid; she was not extinguished by her husband's death, nor did she continue to live mainly nourished by the past, like a Victorian widow. She remained interested and vital in her old age, and at eighty her movements had something of a girl's freedom about them. She bore Darwin ten children, three of whom died while they were still young; four of the sons did faithful and distinguished scientific work, very much in Darwin's spirit and under the influence of his personality.

In later life Darwin grew a long grey-white beard, which he wore almost untrimmed; and his great domed head became almost entirely bald. His cheeks were brown, which made him seem less of an invalid than he was. His blue-grey eyes were very deeply sunken underneath his thick bushy eyebrows, as the portraits show. His forehead was much wrinkled, but otherwise his face was little lined. When he was excited with pleasant talk he could be very much animated, and he had a great pealing laugh. His conversation was accompanied by frequent gestures, and he walked out of doors with a swinging action, using a stout iron-shod stick which he struck loudly against the ground. But indoors his climbing of stairs would be slow, as if every step were an effort. He wore dark clothes, loosely fitting; the best-known portrait shows him looking rather sadly

out from under a big soft black hat, with a long black cloak wrapped round him. Indoors he wore two peculiar garments: a shawl over his shoulders, and large loose fur-lined boots which he could slip over his shoes.

He rose early, chiefly because he could not lie in bed, and took a short walk before breakfast, which he ate alone at seven forty-five. Then he went to work at once, and considered the hour and a half between eight and nine-thirty one of his best working times. Then he came into the drawing-room for his letters—sighing if there were many, rejoicing if there were few. He always answered strange correspondents, however boring or stupid their letters to him might be. He would then lie on the sofa and hear any family letters read aloud, and perhaps part of a novel, till about ten-thirty, when he went back to work till a little after twelve. By this time he had mostly done his day's work, as much as his frail body could stand, and would say in satisfied tones: "*I've done a good day's work.*" He then went out, whatever the weather, perhaps with Polly his white terrier, calling at the greenhouse to look at germinating seeds or experimental plants. This was followed by his "constitutional" stroll either round the Sandwalk—a narrow strip of land which he had planted with a variety of trees—or in the neighbourhood. At one time he used to take a certain number of turns every day, and he would count them by means of a heap of stones, one of which he kicked out on the path each time he passed; later he took as

many turns as he felt he had strength for. Here, too, he would stop and watch his children playing. His only other outdoor recreation was riding, but in later life he had to give that up.

Lunch followed, and after that he lay on the sofa and read the newspaper—the only non-scientific matter which he read to himself. Everything else, novels, travels, history, was read aloud to him. Then came his time for writing letters, sitting in a huge horsehair chair by the fire, sometimes dictating his replies to one of his sons. His rough copies were written on the backs of manuscripts or proof sheets, and were almost illegible, sometimes even to himself. He humorously deplored the bad hand that he wrote. When letters were finished, at about three, he rested in his bedroom, and listened to a novel or other non-scientific book read aloud. He smoked only when resting, and took snuff when working. Sometimes the reading would send him to sleep, but he always came downstairs regularly at four o'clock to dress for his walk. After the walk he might work for an hour, then would be idle until it was time to go upstairs for another rest at about six, with novel reading and a cigarette. He had a light tea while the family ate their dinner, and left directly afterwards, saying that he was an old woman who must be allowed to leave with the ladies. After dinner he played backgammon with his wife, and kept the scores with the greatest excitement. Then he would read some scientific book, either in the drawing-room, or if much talking was going on, in the study.

Sometimes he would listen to his wife playing the piano; he used to assert that with age his enjoyment of music had become dulled, but he was sensitive to style in playing, and had his favourites in Beethoven and Handel. Grand or pathetic songs would move him almost to tears. At half-past ten he went to bed, and generally lay awake or sat up in bed for hours, suffering much discomfort.

It may seem strange that it should be possible to say of a man "this is how he spent his day," as if every day were alike. But it is the case that Darwin's days were as alike as he could make them. His thoughts could only function well, apparently, if his outward life was serene and undisturbed. It took little to trouble his serenity: personal problems, quarrels, the suffering of others no less than his own—all kinds of things would rob him of sleep. Perhaps he had to lead a rigidly ordered life in order to keep alive at all; the connection between his physical weakness (which never showed itself clearly until he was thirty) and his nerves, is obscure; but the fact remains that he loved routine, and had a hatred of change in any way. "I would as soon be called Dog" was his characteristically vigorous answer to the suggestion that his children, who were at the time all grown up, should stop calling him Papa.

In the course of the regular reading he came to know a great many novels: Scott, Jane Austen and Mrs. Gaskell were read to him over and over again. He disapproved of any but a happy ending, holding

that a law ought to be passed against stories that ended unhappily, and openly considered himself, in matters of literary taste, quite outside the pale. He professed, too, to be an ignoramus in all matters of art, but with art, letters and music the case was really the same—he had real appreciation, but was too humble to assert his opinions.

Much of his scientific reading was in German, and this was a great labour to him. He was most indignant with the Germans for writing as they did, and was convinced that they could express themselves simply if they chose. His method of translation was to read a sentence a great many times over, with a dictionary, until at last the meaning occurred to him. He never attempted to speak German correctly, but pronounced the words as though they were English, which made things a little difficult for his sons when he read out an awkward sentence and demanded a translation. He had very little language sense altogether, and asserted that he did not know how to pronounce a single word of French correctly.

It was a severe effort to him to stir from his home; his rare visits to scientific friends in London were made early in the morning. Sometimes he would go for a short holiday in the country, when he would insist on doing his own packing early on the day before his departure. But there was plenty to interest him at home beside his work. He was devoted to his children, and it would be a pity if his experiments with them gave the impression that he was callous:

on the contrary, anxious as he was to observe accurately the muscular reactions of a crying child, his sympathy with the grief would often spoil his observation. Again and again, in his letters to friends, there are expressions of love and pride in them, and keen interest in what they are doing. He was on terms of perfect equality with his family, and bore patiently their raids into his study for anything from stamps to sticking-plaster, the gravest reproach being, "Don't you think you could not come in again, I have been interrupted very often." He could not bear to say a harsh word to anybody; he could never bring himself even to utter a command, and with servants always used the expression "would you be so good" in asking for anything.

As a host he was charming, and the presence of visitors always excited him. He was incapable of understanding the honour that it was to talk to him, and so use up his time and his strength. Gladstone once came, and talked hard during the whole time on one of his own subjects; when he was gone, Darwin said in all simplicity: "What an honour that such a great man should come to visit me!" He met Carlyle, and did not like the way he sneered at everybody; he loved to tell of a dinner party where Carlyle had harangued the company present during the whole meal on the advantage of silence. When visitors came from a distance, as they constantly did, he would conscientiously emphasize the enormous distance of Downe from London, and the labour it

would be to come there. If they persisted, he would arrange their journeys for them, telling them when to come, and practically when to go. His conversation was sometimes difficult to follow, for the first words of a sentence would often remind him of some exception to, or some reason against, what he was going to say; and this again brought up some other point, so that the whole sentence would get tied up in the coils of its efforts to be fair and accurate. When puzzled in talking he would sometimes stammer a little; he used to say that he was a slow and easily flustered arguer.

In his scientific work he was extraordinarily careful and methodical. Number labels which could be read upside down had a mark to indicate the right way up, and diagrams of all kinds must be made to scale. He would regard small objects such as seeds as demons trying to elude him by getting into the wrong heap, or jumping away altogether; and this gave to long hours of investigation the excitement of a game. He never let an exception pass unnoticed—in fact, whenever he came across a fact or thought which was opposed to his general results, he made a note of it instantly, finding (as we all find) that such facts and thoughts were far more apt to escape the memory than favourable ones. He had no respect for the appearance of books, regarding them as tools to be worked with; he would cut a heavy book in half, to make it more convenient to hold, and tear out from a pamphlet all the pages except the one that interested him.

Chapter VII: *Later Writings*

DURING the twelve years following the publication of *The Origin of Species* further editions were continually called for; Darwin prepared six in all, and each was a little different from the last. His main object was to make his meaning plainer and to clear up misunderstandings.

The story of the next few years of his life is the story of the publication of a series of books, all of them dealing with what he called "the grand theory of evolution." Three years after the *Origin* came *The Fertilization of Orchids*; it is a technical work, and was the product of a great deal of research, of hours of patient watching on the grass to observe the way in which insects caused the fertilization of plants. It was perhaps the most masterly treatise on a single species of plant life that had ever appeared. It was followed six years later by the massive two-volumed *Variation of Animals and Plants under Domestication*, which was again intended as a buttress—and a very powerful one—of his theory of evolution. Its theme is that "animals, when removed from their natural condition of life, vary," and it sets out to explain how, and why. Darwin goes carefully into the historical beginnings of all the living things that man has for long domesticated—dogs, cats, horses, donkeys, pigs, cattle, sheep, goats, rabbits, pigeons, poultry, ducks, geese, peacocks, turkeys, guinea-fowls, canaries, goldfish, bees, silkworms, not to

mention innumerable cultivated plants, everything in the vegetable garden, fruits and flowers. It is a gigantic work, full of interest from the first page to the last. To the story of pigeons alone he had given what amounted to years of research; there are over two hundred well-marked breeds of these, and at least ten would normally be ranked as distinct species if they had been in a wild state. But Darwin showed that almost certainly they are all descended from a single type, the blue rock-dove. There are fascinating discussions of inheritance, and Darwin puts forward an elaborate theory to explain the way in which qualities are handed on to offspring, which is outside the scope of a non-scientific biography such as this.

Three years later (he was now over sixty) appeared *The Descent of Man*. Everything that he there wrote had been implied in the *Origin*, but he had wisely calculated that it would be best not to give the public too many shocks at one moment. It raised "a storm of mingled wrath, wonder and admiration," both in England and abroad. As early as 1837, when he first opened his note-books on species, he found that he "could not avoid the belief that man must come under the same law" as the remainder of living things. As each of his children was born, he carefully examined the signs of dawning intelligence, and noted the way in which new sensations and feelings were displayed by it. He read and corresponded widely, and collected an enormous mass of notes on the subject; and the result is a magnificent work. It

used to be a common jeer of the ignorant that "Darwin says we're all descended from monkeys." Darwin says, of course, nothing of the kind: he shows that man certainly has not sprung from any of the known anthropoid apes (gorilla, chimpanzee, orang, gibbon), but from a stock common to him and them, which is a very different thing. He traces the rise of man from some "lower" form with great care, and considers all the points on which man seems to differ from other living creatures—the claims that man alone uses tools and fire, thinks abstractly, is self-conscious, employs language, has a sense of beauty, believes in God or is endowed with a conscience. All these points he meets with arguments drawn from his wide knowledge, and he finds no reason to except man from the general law of the growth of life. There is a great deal of matter in *The Descent of Man* which is by no means generally accepted to-day, but it is a great and a brave book. The closing words have a fine Darwinian ring about them: "We must, however, acknowledge, as it seems to me, that man, with all his noble qualities, with sympathy which feels for the most debased, with benevolence which extends not only to other men, but to the humblest living creatures, with his God-like intellect which has penetrated into the movements and constitution of the solar system—with all these exulted powers—man still bears in his bodily frame the indelible stamp of his lowly origin."

In the next year followed *The Expression of the Emotions*, an expansion of part of his last book. It is

full of absorbing interest, and often of amusement. Darwin had set himself to discover the causes of deep-seated instincts and habits in men and animals; his own and his friends' children were, all unknowingly, his colleagues in investigation. "Give Mrs. Huxley the enclosed," he writes, sending a questionnaire, "and ask her to look out when one of the children is struggling and just going to burst out crying." He was worried about the behaviour of a certain facial muscle. Sometimes, man's sagacity is compared with that of other creatures, and does not come too well out of the comparison: a monkey whom he studied used to look through her eyeglass at objects, and moved the glass nearer and further so as to vary focus, but "Frank's son, nearly two years old (and we think much of his intellect!) is very fond of looking through my pocket lens, and I have quite in vain endeavoured to teach him not to put the glass close down on the object, but he always will do so. Therefore I conclude that a child under two years is inferior in intellect to a monkey." He found three principles which, taken together, seemed to account for most of the expressions and gestures involuntarily used by man and animals. The first was that by reason of which we do a thing once because it is useful, and then in similar circumstances we instinctively do it again, though it is quite useless (as a dog turns, to smooth down the non-existent grass in its basket, before going to sleep). The second concerned our doing something opposite to a useful action in an opposite state of mind, entirely pointless though it

may be; thus, squaring the shoulders and clenching the fists are sensible expressions of power, or being about to attack, but shrugging the shoulders and opening the palms (ordinary signs of not being able to face something) are without sense. The third dealt with what Darwin calls "direct action of the nervous system," quite independent of will or habit—movements under emotion such as sweating, trembling or blushing, which we cannot control, but which somehow give relief to our nervous system, and allow us to "let off steam." Throughout the book Darwin quotes widely from the classics, Shakespeare, the Bible, and English novelists and poets, to illustrate his points. He had some amusing adventures in his pursuit of truth: "I put my face close to the thick glass-plate in front of a puff-adder in the Zoological Gardens, with the firm determination of not starting back if the snake struck at me; but as soon as the blow was struck, my resolution went for nothing, and I jumped a yard or two backwards with astonishing rapidity"—an excellent illustration of the power of instinct over will. On other occasions we find the unwearied naturalist tickling the noses of chimpanzees with straw, to see what muscles they use for frowning, or testing the fear-reactions of his own child: "I made in his presence many odd noises and strange grimaces, and tried to look savage; but the noises, if not too loud, as well as the grimaces, were all taken as good jokes."

Two other botanical works that he published at about this time deserve a mention, *Insectivorous Plants*

and *Climbing Plants*. The first was the result of experiments carried out over a space of sixteen years, and is technical in character, containing important discoveries about the way in which some plants entrap and devour small insects. In *Climbing Plants* he writes: "It has often been vaguely asserted that plants are distinguished from animals by not having the power of movement. It should rather be said that plants acquire and display this power only when it is of some advantage to them; this being of comparatively rare occurrence, as they are affixed to the ground, and food is brought to them by the air and rain." He loved plants, and says "it has always pleased me to exalt plants in the scale of organized beings."

He was now nearly sixty-six years old, and often tired; but his work was not yet finished. He used to say that he had seen so many of his friends make fools of themselves by putting forward new theoretical views in their old age, that he had resolved quite early in life, never to publish any speculative opinions after he was sixty, and once he even exclaimed: "What a good thing it would be if every scientific man was to die at sixty years old, as afterwards he would be sure to oppose all new doctrines." But his own mind was to remain supple for several years yet.

In 1875 he gave evidence before the Royal Commission on Vivisection, and his attitude towards this question is interesting, and typical of him. It is a subject which arouses fierce passions, both among

some extreme "scientific" people who think that any infliction of pain is justified in the cause of advancing knowledge, and among some extreme "humane" people who think that the infliction of pain on animals is never justified, and deny in any case that it can ever advance knowledge. Darwin was extremely scientific and extremely humane—both parties would probably claim him as their own—so his opinion is worth listening to. "You ask my opinion on vivisection," he wrote to a friend; "I quite agree that it is justifiable for real investigations on physiology; but not for mere damnable and detestable curiosity. It is a subject which makes me sick with horror, so I will not say another word about it, else I shall not sleep to-night." There was a vigorous anti-vivisection agitation proceeding at the time (the coining of the word itself, with its suggestion of cutting-up-alive-and-wriggling, and the aura of cruelty that is rather unfairly made to surround it, was a skilful stroke on somebody's part), and the Government were inquiring into the whole question. A Bill was brought before Parliament, which went far beyond the recommendations of the Royal Commission, and a good deal of bitterness was aroused, the public accusing the physiologists of wanton cruelty, and the physiologists accusing the public of meddling in a matter where they were ignorant of the facts. These two counter-accusations—neither of which is probably quite without foundation—continue to be made till the present day. Darwin believed that the cure for cruelty must be in the

improvement of humanitarian feelings. He pointed out that "the gentlemen of England are humane, as long as their sports are not considered, which entail a hundred or thousandfold more suffering than the experiments of physiologists," and he must have been acutely aware of our national failing, the readiness to see and to condemn cruelty, deceit, unfairness, oppression and injustice—in other people. Thus, while he strongly supported any legislation against inhumanity, he believed that physiology could not progress except by means of experiments on living organisms, and "that he who retards the progress of physiology commits a crime against mankind."

At about this time he published two further botanical books, *Cross and Self-Fertilization of Plants* and *Forms of Flowers*. The first was the outcome of eleven years' research and experiment upon the part played by insects in transferring pollen from one flower to another; and the second rounds off his investigations.

When he was seventy-two his last book of all appeared—*Vegetable Mould and Earthworms*, embodying the results of many experiments, some of which had lasted nearly thirty years. In spite of its unpromising title it is a strangely attractive work: "as readable as a novel" is the phrase that suggests itself, but it does bare justice to the book, for there are many novels less well written and with less admirable heroes. As a reviewer remarked at the time: "In the eyes of most men . . . the earthworm is a mere blind, dumb, senseless, and unpleasantly

slimy annelid. Mr. Darwin undertakes to rehabilitate his character, and the earthworm steps forth at once as an intelligent and beneficent personage, a worker of vast geological changes, a planer down of mountain sides . . . a friend of man . . . and an ally of the Society for the preservation of ancient monuments." Though this may sound exaggerated (with the words "the earthworm steps forth," enthusiasm seems momentarily to have outrun accuracy), it is a fair comment: the worm here comes into his kingdom, and a very important kingdom it is. No one can read Darwin's book and feel quite the same towards what he affectionately calls this "timid animal" afterwards. He makes great claims for the worm, but none which he cannot abundantly justify. He does not shrink from exposing its deficiencies—one paragraph begins, quite frankly, "Mental Qualities. There is little to be said on this head." And the worms of his acquaintance remained obstinately indifferent to music—"They took not the least notice of the shrill notes from a metal whistle, which was repeatedly sounded near them; nor did they of the deepest and loudest tones of a bassoon." But for all their lack of social refinement, he finds that "worms have played a more important part in the history of the world than most persons would at first suppose." He shows that they continually swallow earth, both to make their burrows and to extract what nourishment they can from it; and he finds that in this way they pass on an average ten tons of the soil on an acre of ground

through their bodies every year. They help to preserve ancient masonry and objects of archaeological interest which are left on the ground, by burying them beneath their castings. They prepare the soil for plant life by periodically exposing the mould to the air, sifting it and mixing it. For millions of years before man first set his hand to the plough, worms had regularly ploughed up the land, and continue to plough it, and every bit of soil on the surface of the globe must have passed through their bodies many times.

Chapter VIII: Darwin the Man

AFTER the publication of his last book Darwin felt much exhausted, and wrote: "I feel so worn out that I do not suppose I shall ever again give reviewers trouble." He knew that his work was finished; he had done all that he set out to do, and believed that "whether one is worn out a year or two sooner or later signifies but little." "My chief enjoyment and sole employment throughout life has been scientific work; and the excitement from such work makes me for the time forget, or drives quite away, my daily discomfort." But now he had no further strength for work, and "I have no little jobs which I can do." Again he writes: "I have everything to make me happy and contented, but life has become very wearisome to me." He had lived very fully, during his first thirty years, in action—for it must not be

forgotten that as a young man he was athletic, vigorous, fond of all outdoor pursuits, spent five years knocking about the world in a boat of no great size, and that some of his expeditions inland in South America were distinctly adventurous—and during his last forty years, in thought. He had changed the course of thought in every branch of knowledge that he touched; in a memorial volume to him not only zoologists, botanists and geologists, but physicists, chemists, anthropologists, psychologists, sociologists, philologists, historians, politicians and theologians all testified to the part that his writings had played in moulding the thought of man in different ways. He had been honoured by learned societies all over the world—his official biography contains a list of nearly eighty honours, degrees and titles that were conferred on him; but he seems hardly to have realized what this meant, and could never remember what titles he held. He once wrote to a friend: “Does the Berlin Academy of Sciences send their Proceedings to Honorary Members? I want to know, to ascertain whether I am a member; I suppose not, for I think it would have made some impression on me; yet I distinctly remember receiving some diploma signed by Ehrenberg. I have been so careless; I have lost several diplomas, and now I want to know what Societies I belong to. . . .”

His modesty is of an extraordinarily likeable kind, and has in it nothing of the mock-modest, the sheep-like or the merely dull. It went, in Darwin's case, with a most genuine sense of humour. He seems,

often, honestly to have felt that he was a nuisance, and was grateful to people for putting up with him—when he was only fifty he wrote: “I am one of those miserable creatures who are never comfortable for twenty-four hours, and it is clear that I ought to be exterminated.” He really thought that he could not write—he spoke of “my uncouth English,” and used to say that if a bad arrangement of a sentence was possible, he should be sure to adopt it. His English was, in a sense, uncouth—that is to say involved, like his talk, by the continual rush of fresh thoughts and qualifications. But through this uncouthness, by sheer hard work, his meaning gradually becomes built up and emerges, giving his style a characteristic honesty and power of its own. He was not a “good writer,” yet it is hard to wish the style other than it is.

He genuinely believed that his scientific attainments were nothing so very unusual—“Many persons think that what I have done in science has been much overrated, and I very often think so myself. . . .” A scientific friend of his said that he sometimes almost feared to indicate a possible different point of view to Darwin’s own, lest he should receive such an answer as: “What a very striking objection, how stupid of me not to see it before, I must really reconsider the whole subject.” “Good Lord, what a muddled head I have got on my wretched old shoulders,” he wrote to a colleague during the last year of his life, immediately after publishing a brilliant monograph; and phrases such

as "I'm an ungrateful dog" are scattered all through his delightful letters. He was courteous to a fault: perhaps he was over-anxious to avoid personal unpleasantness or dispute by appearing to agree, and he has been blamed, not altogether unjustly, for this tendency; but it must be remembered that he was a sick man, that an argument would certainly rob him of a night's sleep, and that where it was really important to stand for a principle, he would stand to the death. His regard for the truth was so great that he would be kept awake by anxiety less something he had said during the day might have given a false impression: the Vicar of Downe relates how, after a parish meeting held to discuss some disputed point of no great importance, he was surprised by a visit at night; it was Darwin, come to say that on thinking over what he had said during the debate, though his words had been quite accurate, he feared that a certain false conclusion might be drawn from them, and he could not sleep till he had explained. But though he hated quarrelling, he by no means agreed with everything and everybody: he had his pet aversions, and the subjects of spiritualism, homœopathy, or the inheritance of wealth by eldest sons, would draw vigorous criticism from him.

Numerous instances have already been given of his humaneness; it was a strong trait in his character throughout his life. While shooting at Cambridge he had come upon a wounded bird, neglected and dying, and decided never again to find pleasure in

“ a sport that could inflict such painful suffering,” though he had found in it the most eager pleasure up till then. In his *Beagle* diary he relates how horrified he was by the bullock slaughtering in Buenos Aires; ever since his anatomy courses at Edinburgh he had disliked the sight of blood, and his children used to dread going to the study for a piece of sticking-plaster to wrap round a cut finger, knowing how distressed he would be to see the wound. The sight of a horse being misused would cause him to grow pale and faint, and he would always rebuke cruelty.

In social matters he called himself a Liberal or Radical all his life. For politics as such he had little interest, but he was on the side of forward-looking movements, generally on humanitarian grounds. His support of the agitation for the abolition of slaves has already been mentioned. He was moved to great indignation by the way in which brutal employers disobeyed the Act against children climbing inside chimneys to sweep them—“ it makes me shudder to fancy one of one’s own children being forced up a chimney, to say nothing of the consequent loathsome disease and ulcerated limbs. . . .” He hated the way in which the land was kept from the people of England, and wished for the abolition of the existing laws of inheritance, and the creation of more small freeholders: “ how atrociously unjust are the stamp laws, which render it so expensive for the poor man to buy his quarter of an acre; it makes one’s blood burn with indignation.” He saw that the conventional education of his class had served its usefulness,

and was already out of date—but he sent his eldest son to Rugby. “No one can more truly despise the old stereotyped stupid classical education than I do ; but yet I have not had courage to break through the trammels.” He could not spare the strength to struggle for a more all-round education for his children, but he saw clearly how the conventional one was cramping them, as it had cramped himself. He fancied that he could “perceive the ill and contracting effects on my eldest boy’s mind, in checking interest in anything in which reasoning and observation came into play. . . . I shall certainly look out for some school with more diversified studies for my younger boys.”

The friendly terms on which he lived with his children have already been referred to: his family seem to have had none of that awe of their parents which Victorian children are supposed to have had. There is a story of one of the boys hanging over the banisters, shouting down to another who was just holding open the drawing-room door: “Who’s there?” And the cheerful answer came back: “Nobody much.” In the drawing-room at the moment were their father and mother and various aunts and uncles. On very rare occasions he could be stern enough, when he thought it obviously necessary, and such moments were unforgettable. Late in her own life a daughter of his was able to recall “the very place in the passage where my Father looked sternly at me.” And once a son of his, happening to pass the study, heard through the

half-open door the following conversation between Darwin and a gardener who was reported to have struck his wife: "You know you are a very ill-tempered man, don't you?" "Yes, sir." "Then you ought to be ashamed of yourself!" It was an awful moment for the boy, and "at this point I rushed upstairs to my bedroom and hid my head under my pillow in terror at hearing my father speak like that."

Darwin's views on religion have been referred to from time to time in tracing the story of his life, but they are worth a separate and fuller mention, since they are typical of the man. To put it very briefly, he thought very little about the matter during his youth, and followed the conventional beliefs in which he had been brought up without testing them. After the *Beagle* voyage he began to reflect more deeply, and, as he says, "disbelief crept over me at a very slow rate, but was at last complete. The rate was so slow that I felt no distress." But he was never antagonistic towards other people's faith: he was deeply distressed at being so "atrociously abused" as he was by his religious countrymen, and was most unwilling that his own conclusions—which he knew to be incomplete—should influence others. "My theology is a simple muddle," he wrote late in his life; "I cannot look at the universe as the result of blind chance, yet I can see no evidence of beneficent design, or indeed of design of any kind, in the details."

He was greatly worried, as anyone who thinks

about the world must be, by the problem of evil: "there seems to me too much misery in the world. I cannot persuade myself that a beneficent and omnipotent God would have designedly created the *Ichneumonidæ* with the express intention of their feeding within the living bodies of Caterpillars, or that a cat should play with mice. Not believing this, I see no necessity in the belief that the eye was expressly designed. On the other hand I cannot anyhow be contented to view this wonderful universe, and especially the nature of man, and to conclude that everything is the result of brute force. I am inclined to look at everything as resulting from designed laws, with the details, whether good or bad, left to the working out of what we may call chance. Not that this notion *at all* satisfies me. I feel most deeply that the whole subject is too profound for me. . . . Let each man hope and believe what he can."

Darwin was certainly no theologian, and his thoughts on religious subjects are given, not for what they contain, but for the light they throw on him. "In my most extreme fluctuations," he wrote near the end of his life, "I have never been an Atheist in the sense of denying the existence of God. I think that generally (and more and more as I grow older), but not always, that an Agnostic would be the more correct description of my state of mind."

Meanwhile, he was content to help any religious institution in doing good; he sympathized with the

work of the English Church in his parish, and was for over thirty years firm friends with his neighbour the Vicar, though "we never thoroughly agreed on any subject but once, and then we stared hard at each other, and thought one of us must be very ill!" Some public comment was caused by the fact that Darwin, whose reputation as the shatterer of religious faith was so widespread, should for years have been a warm supporter of the South American Missionary Society. He had once thought, and said with great conviction, that it was useless to send missionaries to such a set of savages as those in Terra del Fuego, probably the very lowest of the human race; but he later admitted his mistake, and used to send an annual subscription to help the work of teaching a faith in which he himself could not believe to the friends and relations of Jemmy Button.

One of the reasons why he was ill at ease on the subject of religion was his dislike of abstract thinking. He did not like ideas for themselves; he liked observing facts. "I must begin with a good body of facts, and not from a principle (in which I always suspect some fallacy)," he used to say. After reading his grandfather Erasmus' *Zoonomia* he expressed himself "much disappointed; the proportion of speculation being so large to the facts given." He himself used to say that all his powers of appreciation had grown dulled with age, and that his mind seemed "to have become a kind of machine for grinding general laws out of large collections of facts." Up till the age of thirty he had loved poetry, pictures and

music, "but now for many years I cannot endure to read a line of poetry; I have tried lately to read Shakespeare, and found it so intolerably dull that it nauseated me. I have also almost lost my taste for pictures or music. . . . I retain some taste for fine scenery, but it does not cause me the exquisite delight which it formerly did." This admission has been used as a horrible warning against specializing in scientific pursuits—quite unjustly. Too much has been made of it altogether: this narrowing of spiritual perception, if it was as great as he believed, was a serious loss; but there is no reason to connect it with scientific rather than with any other kinds of interest, and nothing to show that in Darwin's case it would not anyhow have occurred. In truth he had never cared for music like a musical person, and still less for poetry, only for the generalized sense of being moved and enlivened which works of art gave him; and this is a form of caring which normally passes with youth, and gives place to true appreciation.

Darwin's real importance lies, perhaps, in something that cannot be simply related in an account of his life. He was a good-living man, an indefatigable naturalist, and an honest thinker; but goodness, tirelessness and honesty are qualities that have often come together, yet failed to produce the profound effect that this man's life produced. Darwin is one of those people who amount to much more than the sum of their parts: it seems as if he were the chosen instrument through which a revolution in human

thought was destined to be brought about. His unconscious influence upon his age was enormously powerful. At home he was the point upon which all kinds of forces centred, which were to blow up the complacency of nineteenth-century thought—as really it was longing to be blown up. Abroad his influence was no less powerful: his theories were widely read and discussed all over the world during his lifetime, he was very highly prized in Russia, while in Germany Karl Marx—as important a world-shaker as Darwin himself, the man whose criticisms of the “capitalist” system of production for profit have converted so many people to socialist or community-serving ways of thought—wished to dedicate his great book *Das Kapital* to him.

The last words of an autobiographical sketch which he wrote at the very end of his life, are these:

“ My success as a man of science, whatever this may have amounted to, has been determined, as far as I can judge, by complex and diversified mental qualities and conditions. Of these, the most important have been—the love of science—unbounded patience in long reflecting over any subject—industry in observing and collecting facts—and a fair share of invention as well as of common sense. With such moderate abilities as I possess, it is truly surprising that I should have influenced to a considerable extent the belief of scientific men on some important points. . . . As for myself, I believe that I have acted rightly in steadily following and devoting my life to Science. I feel no

remorse from having committed any great sin, but have often and often regretted that I have not done more direct good to my fellow creatures.”

He died in 1882, in his seventy-fourth year, and his body was buried in Westminster Abbey, a few feet away from that of Isaac Newton.

DARWIN'S CHIEF BOOKS

(The books whose titles are printed in italics are on the whole of a technical character. The rest are suitable for the general reader; and of these, the "BEAGLE" JOURNAL, VEGETABLE MOULD AND EARTHWORMS, and THE EXPRESSION OF THE EMOTIONS are perhaps the easiest.)

- 1839 JOURNAL OF RESEARCHES [on the "Beagle" voyage]
1842 *Coral Reefs*
1844 *Volcanic Islands*
1846 *Geological Observations on South America*
1859 ORIGIN OF SPECIES
1862 *Fertilization of Orchids*
1865 *Climbing Plants*
1868 VARIATION OF ANIMALS AND PLANTS
1871 DESCENT OF MAN
1872 EXPRESSION OF THE EMOTIONS
1875 *Insectivorous Plants*
1876 *Cross and Self-Fertilization*
1877 *Forms of Flowers*
1881 VEGETABLE MOULD AND EARTHWORMS