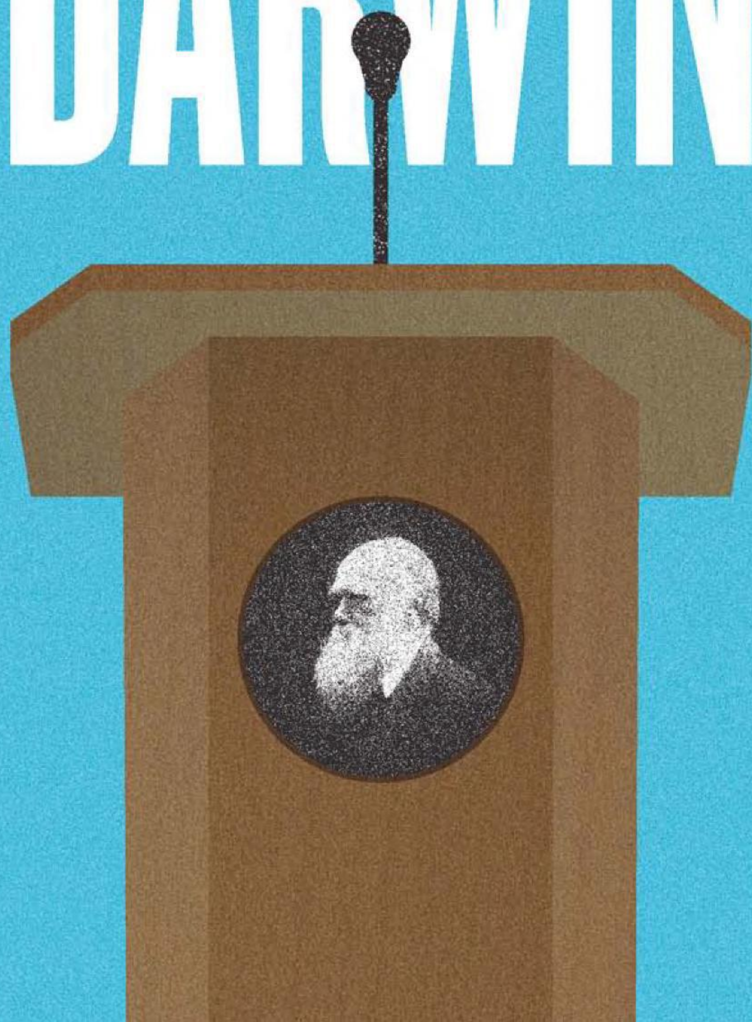
ROBERT J. RICHARDS & MICHAEL RUSE

DEBATING DARWIN



DEBATING DARWIN

Robert J. Richards and Michael Ruse

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PREFACE

The British naturalist Charles Robert Darwin (1809–82), author of *On the Origin of Species by Means of Natural Selection or the Preservation of Favoured Races in the Struggle for Life*, is rightfully known as the "father of evolution." In his lifetime, Darwin's accomplishments were recognized and appreciated. At his death he was buried in that British Valhalla, Westminster Abbey, where he lies today, next to the great Isaac Newton. He is still respected and venerated, both publicly and professionally. In the world of everyday life, his bearded face peers out from the back of the British ten-pound note. In the world of science, he is recognized as one of the truly great thinkers whose achievements are the foundation for much of contemporary biology.

From the very beginning, Darwin and his ideas were highly controversial. During his lifetime the religiously orthodox began an attack that has continued to the present day, especially in the United States. Though some churchmen have made accommodation to evolutionary theory, religious fundamentalists still regard Darwin as the enemy; and they are often abetted by conservative politicians. In the scientific community, no serious biologist doubts what might be called the fact of evolutionary descent, though researchers still debate the precise role of natural selection in producing species change. Among social scientists, humanists, and philosophers, the reaction to Darwinian theory is mixed; few deny its power in explaining the development of plant and animal species, but many would hesitate to apply evolutionary considerations to account for human behavior and social relationships.

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Given the magnitude and reaction to Darwin's theory, it is hardly surprising that historians and philosophers of science have taken a deep interest in his intellectual development and the precise nature of his accomplishment. They have been aided in their research by Darwin's own habits of mind—he retained almost every scrap of paper to which he put pen. The collection of manuscripts at Cambridge Library and other archives has allowed scholars to follow Darwin in the production of his ideas; and much of this material is now in print or online. The Cambridge edition of Darwin's correspondence, for example, has now reached volume 22, with at least another ten planned; and many of his manuscripts have been digitized and made available on the Internet.

You might expect that with all the resources now available to Darwin scholars a consensus would have been reached about the nature of his achievement. Certainly there is agreement about the broad outlines. We know, for example, about when and under what conditions Darwin came to endorse the transmutation of species, and what stimulated him to formulate the principle of natural selection. We can track with some assurance the fate of his religious convictions, and be confident about his intention to bring human beings under the explanatory framework of his theory. But the facts of Darwin's development and the claims of his theory do not speak for themselves. Or rather, they speak for themselves only when the historian has put them in proper context and the philosopher has entered into the mind of Darwin to understand how he conceived these facts and claims. With respect to the interpretative framework and the conclusions to be drawn about Darwin's intentions, we, the authors of this book, do differ and passionately so. In the pages that follow, our differences will be on vibrant display: our arguments will be pointed and the responses aggressive. Our dispute has been of long standing, but it has not tainted our friendship.

It might be thought that our differences are essentially a function of disciplinary boundaries. One of us, Ruse, has always been located in departments of philosophy. The other, Richards, has long been a member of departments or centers of history. Hence, it might be supposed that the disagreements come from talking past each other, as

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the philosopher wants to stress unadorned, timeless concepts and the historian wants to place everything in time-bound culture. This is not so. We both take on questions of historical context and philosophical interpretation, and recognize that our disagreements are more profound and more interesting than simple disputes about disciplinary methods. We are not talking past each other but right at each other. Yet each comes to quite different conclusions and thinks the other has simply been wandering in the intellectual wilderness.

Darwin was British-born and educated in the English system. Apart from a five-year voyage on HMS *Beagle* that took him around the globe, he spent the whole of his life in Britain. Is this the essential key to the man and his work? One of the authors, Ruse, thinks that it is, absolutely and completely. He sees Darwin's science as British as (let us say) Lord Palmerston's foreign policy or Charles Dickens's fiction or Joseph Paxton's Crystal Palace built for the Great Exhibition. The other author, Richards, argues that it is not Darwin's physical geography that essentially matters, but his mental geography, which extends far beyond British shores. It was, after all, the German Romantic Alexander von Humboldt's account of his travels to the new world that led Darwin to embark on his own romantic adventure. Richards believes that to ignore the impact of the German Romantics and their legacy—especially that legacy transported to England and traveling under the guise of British names—would be to miss the significance of Darwin's achievement in the *Origin of Species* and the *Descent of Man*.

This is our disagreement. Was Charles Darwin quintessentially British, or was his attitude thoroughly cosmopolitan, encompassing as well ideas from German Romantic sources? More specifically, this is a debate about such topics as mechanism or mind in nature; teleology faux or real; human beings deluded about their moral character or intrinsically moral. And what does this tell us about the present? We are both sufficiently indoctrinated into modern historiographical practices that we rear with horror at the thought of writing something that simply tells a story of progress from the mistaken past to the enlightened present; but we are both evolutionists, and we think that, in culture as in biology, in order to understand the present you

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must understand the past. Hence we do not look upon this clash as an exercise in self-indulgence, two good friends simply having a vigorous game of intellectual handball.

We think that what we have to say matters and that, depending on the side you think is the more convincing, so will you view evolutionary thought and its implications today. We will be especially keen to indicate how these historical matters impinge on our understanding not only of nature writ large, but also on human nature and especially on the moral character of our species. The conflagrational disputes over sociobiology, evolutionary psychology, and selfish genes have concerned the way Darwinian theory has construed human nature—indeed, we might ask, can we even speak of a distinctively human nature in the wake of evolutionary considerations? We believe that these disputes will achieve greater clarity when we return to their original site in the work of Charles Darwin.

We had thought that we might be able to write a neutral historical introduction laying out some of the established facts about Darwin and his work. Very quickly we found that this was impossible. In an almost Kantian fashion, as soon as we started to look at the real world, interpretation kept rushing in. So we have set about telling the story in our own ways, although we have constantly exchanged ideas and drafts in order to focus our own thinking and to sharpen our points of disagreement; we do, though, provide a shared timeline of the main events. After each of our essays, we make a concise response to the other's arguments. In the epilogue to this book, we join together to trace the consequences of Darwin's accomplishment for the development of evolutionary theory in the period of the late nineteenth century to the present. We are especially attentive to what Darwinian theory implies for that most characteristic of human traits, conscious thought and religious aspiration. This essay thus seeks to discover what is still living and vital in the ideas that have given rise to modern biology—yet more, the role of those ideas in coming to understand ourselves.

We are indebted to David Sepkoski, Mark Borrello, and Gregory Radick, who patiently read earlier drafts of our contributions. They kept their criticisms jagged and merciless. Despite their rough treat-

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ment, we are deeply grateful for the application of their incisive considerations. We wish to thank, as well, our editor at the University of Chicago Press, Karen Darling. Her own reading helped each of us focus efforts to greater effect. She did not take sides and kept her amusement impartial. The Press's referees made decisive suggestions, for which our thanks is due. We are grateful to the John Templeton Foundation for its financial support in our enterprise. Ruse would also like to thank the Stellenbosch Institute for Advanced Study in South Africa—noting especially its director Hendrik Geyer and his staff—that provided a home while he completed his share of this exchange. Finally, readers will find that understanding our arguments and judging our differences demand a very close reading of Darwin's texts, both those published and those unpublished (in his lifetime). We strongly recommend that the reader make full use of two extremely helpful websites: John van Wyhe's *Darwin Online*—http://darwin-online.org.uk/; and David Kohn's *Darwin Manuscripts Project*—http://www.amnh.org/our-research/darwin-manuscripts-project. Not only will the reader find at hand all of Darwin's published writings, in their many editions, but also the vital, unpublished sources.

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TIMELINE

1688	The Glorious Revolution—the Catholic King James II is deposed and the Protestant monarchs William III and Mary II assume the throne
1712	Invention of the Newcomen engine, used to pump water out of mines
1749	Birth of Johann Wolfgang von Goethe
1757	David Hume's *Natural History of Religion* is published
1759	Josiah Wedgwood founds pottery works
1760	Robert Bakewell takes over family farm in Leicestershire and starts program of intensive breeding
1776	Adam Smith's *Wealth of Nations* is published
1769	Birth of Alexander von Humboldt
1761	Opening of Bridgewater Canal, taking coal to Manchester
1781	Immanuel Kant's *Critique of Pure Reason* is published
1785	Invention of first power loom, by Edmund Cartwright
1789	Start of the French Revolution
1790	Immanuel Kant's *Critique of the Power of Judgment* is published
1790	Johann Wolfgang von Goethe's *Metamorphosis of Plants* is published
1794	Erasmus Darwin publishes the evolutionary work *Zoonomia*
1798	Thomas Robert Malthus publishes *An Essay on the Principle of Population*

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1799–1804	Alexander von Humboldt and Aimé Bonpland travel to the Americas
1802	William Paley publishes *Natural Theology*
1804	Napoleon crowns himself Emperor of France
1807	Slave trading made illegal in the British Empire
1808	Johann Wolfgang von Goethe's *Faust*, part 1, appears
1809	Jean-Baptiste Lamarck's *Philosophie Zoologique* is published
1809	Birth of Charles Robert Darwin
1813	Robert Jameson publishes Georges Cuvier's *Essay on the Theory of the Earth* (translation of 1812 French edition)
1813	Napoleon defeated by the allies at the Battle of Leipzig, where 600,000 soldiers clashed
1815	Battle of Waterloo, Napoleon finally defeated
1817	Georges Cuvier publishes *Le Règne Animal* (*The Animal Kingdom*) stressing conditions of existence
1817–24	Johann Wolfgang von Goethe's collection *Zur Morphologie* is published
1818	Darwin enrolls as boarder at Shrewsbury School
1818–29	Translation of Alexander von Humboldt's seven-volume *Personal Narrative of Travels to the Equinoctial Regions of the New Continent, 1799–1804* is published
1825	Darwin begins medical studies at Edinburgh University
1828	Darwin enrolls at the University of Cambridge to start BA with the intention of becoming an Anglican clergyman
1828	Carl Gustav Carus's *Von der Ur-Theilen des Knochen- und Schalengerüstes* is published
1830	Opening of first steam passenger railway, between Manchester and Liverpool
1830	John F. W. Herschel publishes *A Preliminary Discourse on the Study of Natural Philosophy*
1830–33	Charles Lyell publishes the *Principles of Geology*
1831	Darwin joins HMS *Beagle* under the captaincy of Robert Fitzroy

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1831	First meeting (in York) of the British Association for the Advancement of Science
1832	First Reform Act (Darwin's uncle Josh, father of Emma Wedgwood, becomes a member of the new parliament)
1833	Abolition of slavery throughout the British Empire
1834	New Poor Law, creating "unions" of workhouses, so unpleasant that the poor would do anything to avoid them
1835	The *Beagle* visits the Galapagos Archipelago in the Pacific Ocean
1836	The *Beagle* returns to England
1837	In the spring, influenced by the British Museum ornithologist John Gould's identification of three types of Galapagos mockingbird as good species, Darwin becomes an evolutionist
1837	William Whewell publishes *The History of the Inductive Sciences*
1838	At the end of September, Darwin reads Malthus and discovers natural selection
1839	Early in the year, Darwin marries his first cousin Emma Wedgwood
1839	Darwin's *Journal of Researches of the Voyage of the Beagle* is published
1840	Rowland Hill starts the penny post
1840	William Whewell publishes *The Philosophy of the Inductive Sciences*
1842	Darwin writes out the first "Sketch" of his theory, some 35 pages
1844	Robert Chambers publishes *The Vestiges of the Natural History of Creation* anonymously
1844	Darwin expands his 1842 sketch into a 230-page manuscript, the "Essay"
1846	Darwin begins his study of barnacles
1849	Richard Owen's *On the Nature of Limbs* is published
1851	The Great Exhibition, celebrating Britain's supremacy in industry and technology

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1852	Herbert Spencer starts writing on evolutionary topics
1854	Darwin finishes with his four volumes on extant and extinct barnacles, and turns back to evolutionary topics
1856–58	Darwin works on manuscript to be called *Natural Selection*, which in abbreviated form becomes the first part of the *Origin of Species*
1858	Alfred Russel Wallace sends to Darwin his paper on evolution
1859	Toward the end of the year, Darwin publishes the *Origin of Species*
1863	Thomas Henry Huxley publishes *Man's Place in Nature*
1871	Darwin publishes the *Descent of Man*
1882	Darwin dies and is buried in Westminster Abbey
1900	Mendel's thinking on heredity is rediscovered
1930	Ronald A. Fisher publishes *The Genetical Theory of Natural Selection*
1931	Sewall Wright publishes "Evolution in Mendelian Populations"
1964	William D. Hamilton publishes "The Genetical Evolution of Social Behaviour"
1975	Edward O. Wilson publishes *Sociobiology: The New Synthesis*
1976	Richard Dawkins publishes *The Selfish Gene*
1995	Daniel Dennett publishes *Darwin's Dangerous Idea*
2012	Thomas Nagel publishes *Mind and Cosmos: Why the Materialist Neo-Darwinian Conception of Nature Is Almost Certainly False*
2015	Jerry Coyne publishes *Faith vs. Fact: Why Science and Religion Are Incompatible*

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CHARLES DARWIN: GREAT BRITON

PROLOGUE

Charles Darwin was first and foremost a scientist, a very great scientist, who not only made scientifically plausible the idea of organic evolutionary change but who came up with natural selection, what today's professional scientists generally consider to be the chief motive force of such change. Yet from the first, as Darwin himself recognized, his thinking was always more than just about scientific explanations of the organisms occupying the physical world. His thinking pointed the way to a new or revived philosophical perspective on reality. A harsher, less-comfortable one than that he inherited. The popular-science writer and ardent atheist Richard Dawkins has written:

> In a universe of blind physical forces and genetic replication, some people are going to get hurt, other people are going to get lucky, and you won't find any rhyme or reason in it, nor any justice. The universe we observe has precisely the properties we should expect if there is, at bottom, no design, no purpose, no evil and no good, nothing but blind, pitiless indifference. As that unhappy poet A. E. Houseman put it:
>
> > For Nature, heartless, witless Nature
> > Will neither know nor care.
>
> DNA neither knows nor cares. DNA just is. And we dance to its music.[1]

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As a staid and very respectable Victorian, Charles Darwin would have been horrified at the frenzied polemics that characterize the writings of the so-called New Atheists. Whatever his personal beliefs, he would never have flaunted his thinking in such a crude and public way. It is doubtful also whether Darwin ever reached quite the state of naturalistic nihilism expressed by Dawkins. Even if he took us all of the way, it is certainly not my claim that Darwin unaided took us to this new world. Internal issues in religion like so-called higher criticism (looking at the Bible as a human-written document) played a crucial role, as did social factors like the move from the land to the city demanding new ideologies for new types of existence. But Darwin's work pointed that way, and he knew it and pursued it. If like Moses and the Promised Land he never quite arrived, he beat the path toward it, consciously and intentionally. Darwin changed not just science; he changed philosophy also, and this is the world in which we now live.

Such is my claim in this, my section of this book. Moreover I argue that Darwin did all of this within a tradition on which he drew. A tradition that in many respects was quintessentially English, the land of his birth, but that was more broadly British, not only because Darwin was in part educated north of the border, but because Darwin always drew heavily on thinking that came from the so-called Scottish Enlightenment. In short, I argue that although Darwin was a great revolutionary—and I bow to no one in my belief that he made major advances in our understanding of the empirical world—he was not a rebel. He did not repudiate his past, hating and trying to destroy and eliminate that from whence he came. It was rather that he took what was offered and then rearranged and transformed the elements into an altogether new picture. Darwin's work was like a kaleidoscope. The pieces were there. Darwin shook them up and made something different. But where did the pieces come from that I claim were so important in Darwin's past? I argue—and here I would stress that I am being totally unoriginal and simply drawing on what one finds in any good textbook—that the Britain into which Darwin was born at the beginning of the nineteenth century had two major elements or

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themes or traditions. It was his good fortune to be able to draw on both elements and his genius to do with them what he did.

The one element is what we might with reason call the conservative element, the Tory side to Britain. This is the world of the king (George III and the Prince Regent, the future George IV) and of his supporters, political, military (including naval), and most of all clerical. It is the world of landowners, but usually not the biggest men. They were more the leaders in the villages that one finds in the novels of Anthony Trollope (although he was writing a little later), men like Wilfred Thorne, the squire of St. Ewold's in *Barchester Towers*. It is the world of the Church of England parson, the world (again in *Barchester Towers*) of Archdeacon Theophilus Grantly. And it is very much the world of England's two ancient universities, Oxford and Cambridge. The clerical world and the academic world were truly but one, for to graduate from the universities one had to be a paid-up, believing member of the Church of England and most of the teachers, the "dons," at Oxford and Cambridge had taken holy orders. To refer one more time to Trollope's great novel, remember that the man who becomes Dean of Barchester, Francis Arabin, is a fellow of Lazarus College (a thinly veiled portrait of Christchurch) and a sometime professor of poetry at Oxford.

The other element is what we might with equally good reason call the liberal element, the Whig side (after the Reform Bill of 1832 joined by the Radical side) to Britain. Their leaders were the great landowners, men like the Duke of Omnium in Trollope's political novels. Somewhat paradoxically, they were often joined by the bishops of the Church of England. Bishoprics are bestowed by the government of the day, sometime Whig or liberal. The politicians wanted supporters not the thanks of the village priests. The plot of *Barchester Towers* revolves around the fact that Archdeacon Grantly, firmly Tory, does not get to follow his father into the see of Barchester. The post goes instead to the Whig Bishop Proudie. The leaders of the Whigs were allied with the men of industry. Whereas the Tories inclined toward protectionism, looking to the interests of the rural leaders—the notorious Corn Laws enacted after the Napoleonic Wars were the

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epitome of such inclinations, designed as they were to keep high the value of homegrown grains—the Whigs inclined toward free trade, something that opened up markets for the products, initially and overwhelmingly cotton but later moving more toward manufactured goods in iron and nonferrous metals, flowing from the labors of those directed by the leaders of industry. There was often no conflict between the interests of the big landowners and the industrialists, because the former owned valuable coal and mineral deposits on which the ever-increasing number of factories very much depended.

I shall argue that both of these elements had beliefs and ideologies, secular and sacred, that spoke to their interests. I shall argue also that Darwin almost uniquely was in a position to draw on both sides and that he did. Darwin's genius may be a mystery—why should a young man of somewhat modest gifts (in areas like linguistic or mathematical abilities), who was born to a life of ease, end by doing so much? The influences from the culture in which he was reared, the sources on which he drew, are no mystery. They span the spectrum of ideas and beliefs that formed and molded the society into which he was born. And it was because of this that Darwin was set on his life's quest, one that transformed the life sciences and—as encapsulated in the quoted passage by Richard Dawkins—took us to the world of today, a world that many still resist but that in the end closes off the world of yesterday, the world into which Charles Darwin was born.

BRITAIN BEFORE DARWIN

The "Glorious Revolution" of 1688 saw the dethroning of the Catholic king, James II, and the accessions of his Protestant daughter and son-in-law, Mary II and William III. As importantly, it saw the real beginnings in Britain of "constitutional monarchy," where increasingly parliament had an effective voice in the running of the country. When James's Protestant daughters, Mary and then Anne, failed to produce heirs, the throne was handed over to the rather dull, but safely Protestant, German royal family from Hannover, whose dynasty lasted through the life of Charles Darwin, ending only with

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the death of Queen Victoria in 1901. Uninspiring though the family may have been, it ruled over a country that went at the beginning of the eighteenth century from the fringe of Europe to ending the nineteenth century as the greatest power that the world had ever seen, with a quarter of the globe colored red for the British Empire. No one single causal factor can be isolated for this growth, but a major factor was the freeing of the country from the autocratic power of monarchs whose chief interests would have been in preserving the structure of the society that had promoted them to the pinnacle. With others now having not just an interest in the fortunes of the country, but with real power and possibilities of molding things to their own ends, almost uniquely the country had reasons to promote stability and the chance to move forward in new directions. Combine this with massive increases in scientific knowledge in the seventeenth century, often geared to practical ends, and the unrivaled natural gifts of the land—ready supplies of fuel, an abundance of needed minerals, rivers and seas for easy transport, a temperate climate, and much more—and Britain was able to seize the chance and build that industrial land on which its future fortunes were to be based. Ours is a story about one part of that great and progressive change.[2]

From Farm to Factory

If the metaphor of the Scientific Revolution is the timepiece—in the words of Robert Boyle, the world is "like a rare clock, such as may be that at Strasbourg, where all things are so skillfully contrived that the engine being once set a-moving, all things proceed according to the artificer's first design"[3]—then the metaphor of the British Industrial Revolution of the eighteenth century is the Newcomen engine[4] (see figure 4). Making its first appearance in the second decade of the century, it transformed mining as it worked its steady pace to suck the water out of the tunnels far below and made possible ever-greater exploitation of the minerals and fuels there for the asking. One may question whether, as has been suggested, its feedback processes—heated steam expanding and then bringing on squirts of cold water and consequent condensation and contraction—are mirrored by the

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economy of the day—laissez-faire leading to overproduction, contraction, and ever-newer opportunities, all driving the country forward—whereas the never-deviating, endless motions of the clock mirrored the fixed and stifling rules of countries beneath the yokes of all-powerful monarchs.[5] What is beyond question is that the engine and the many subsequent inventions—especially those that transformed the production of cotton—lay at the heart of the great changes that ran through almost every part of the British Isles.

Yet to focus first on industry is to get ahead of ourselves. Napoleon Bonaparte said that "an army marches on its stomach." The same can be said of countries, so let us start there. Britain, England particularly, saw major changes in agriculture and food production in the eighteenth and early part of the nineteenth century. The amount produced increased hugely and at the same time the labor required stayed constant, to the extent even of freeing for other opportunities numbers who hitherto had had some connection with the land. There were several reasons for this, although whether cause or effect is often hard to discern. New crops were being introduced, notably clover and turnips. The latter particularly played a crucial role in enabling farmers to feed their livestock over winter without the need for annual mass slaughter at the end of the summer. Methods of livestock improvement were being discovered and refined. Above all it was realized that selective breeding was the key to success. With these changes, the social structure of rural Britain was being changed. To this point, people working on the land had followed rules and practices that reached back into medieval times, with small-holders tilling strips of land that rotated crops, with common land for grazing, and with woodlands for wood collecting and foraging. Now, land was being "enclosed," cut off from public ownership and made the property of individuals, and marginal members of society, who had before subsisted on traditional rights of gleaning and keeping a cow or two on common land and finding fuel in the woods, were either reduced to the roles of employed day laborers or encouraged to leave and move to the ever-growing towns and cities.

Increasingly work was becoming available in the urban centers, particularly the new towns and cities of the British Midlands and

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the North—Birmingham, Manchester, Liverpool, Leeds, Newcastle, and up into Scotland. Obviously this more industry-focused labor was not something that appeared overnight, but slowly and surely implements and machines were introduced at various stages of the process and as slowly but surely it became more and more efficient to collect workers all in one place and to impose on them the rules and restrictions of the modern workplace. The reasons for change and where and how it occurred were manifold and often complex, but one thing does stand out, namely, that increasingly fossil fuel was used to supplement or replace hand labor. In a word, coal. Its availability in Britain was perhaps the major factor in the move to industrialism and the amount mined grew almost exponentially in the century and a half beginning in 1700. The amount mined fueled the changes but at the same time demanded changes, especially in devising ever-more-efficient pumps to remove water from the ever-deeper shafts being dug. And there was a ripple effect. Carrying something like coal is far, far easier by water than by land, and so there was an improving of already-existing waterways and the digging of a network of new canals all over the country. Within a year (1761), a new canal (the Bridgewater) linking Manchester with a colliery a few miles outside the city dropped the price of coal by half.

The changes led to new patterns of everyday life and most particularly to an explosive growth in the population. Down on the farm, the younger generation basically had to wait until the older generation could no longer do the daily work. There was therefore strong incentive to postpone marriage and a family until one could take over and build a life for oneself. In the town or city, working in a factory, the highest wage period came early, and so there was much less reason for restraint. Essentially this meant that the childbearing time was longer and so families grew in size. The biology was reinforced by culture, because a lot of the new industries put a premium on the work of women and children, and thus a larger family equaled a more prosperous family.

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Making Sense of Change

Naturally these changes attracted the attention of the theorists, and it is in this time that we see the birth of the science of political economy. Even today, the Scot Adam Smith (figure 2) commands respect. He was the theoretician of the factory and its functioning, introducing one of the all-time, best-known, and most powerful metaphors: "the division of labor," or "labour" as he spelled it.[6] Taking the example of the manufacture of pins, Smith argued that a man working on his own, doing everything, would make but a few dozen, if that, a day. But divided into a team, with each doing his allotted task—grinding, polishing, and so forth—literally thousands a day can be produced. There is no magic to this. It is more efficient that each person perfect his or her own skill and do it time in and time out, passing on the semi-finished product to the next down the line until the whole job is finished. Smith was also keen on transport, especially by water. "Six or eight men . . . by the help of water-carriage, can carry and bring back in the same time the same quantity of goods between London and Edinburgh, as fifty broad-wheeled waggons, attended by a hundred men, and drawn by four hundred horses."[7]

And above all, introducing yet another of the famous metaphors of British culture, Smith lauded the virtues of self-interest, where everyone is seen in the rather unkind words of the author of *Peter Pan*, playwright J. M. Barrie, as a "Scotsman on the make." We naturally tend to promote the industry of the land within which we live, for the obvious reason that we will be better off and more secure in a prosperous nation rather than otherwise. By so doing, an individual "generally, indeed, neither intends to promote the public interest, nor knows how much he is promoting it. By preferring the support of domestic to that of foreign industry, he intends only his own security; and by directing that industry in such a manner as its produce may be of the greatest value, he intends only his own gain, and he is in this, as in many other eases, led by an invisible hand to promote an end which was no part of his intention."[8] Not that this end will necessarily be only of benefit to the individual. "By pursuing his own interest he frequently promotes that of the society more effectually

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than when he really intends to promote it." Concluding sardonically: "I have never known much good done by those who affected to trade for the public good." The ultimate power, the deity—"The invisible hand"!—has seen to it that individual self-regard spells benefits for all. As Smith put it somewhat more pithily: "It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest."[9]

Then at the end of the eighteenth century came Parson Malthus (figure 3). Appalled at the naive optimism that he saw emanating from the continent—and no doubt frightened near to death by the dreadful consequences (the "Reign of Terror") to which he thought it had led—and certainly mindful of the incredible population explosion now in full flight in Britain, Thomas Robert Malthus (he was generally known as "Bob") published a pamphlet that in succeeding editions grew into a full-sized book, in which he drew attention to the dire expectations that we should expect from unrestrained sexual activity and the production of ever-more mouths to feed.[10] Food can be produced and increased only according to an arithmetic scale: 1, 2, 3, 4 . . . Population numbers however have the potential to go up at a geometric rate: 1, 2, 4, 8 . . . This can lead only to strife and conflict. Eventually there will be fights among humankind for territory and food. Introducing yet another of the famous metaphors that will control future discussion, Malthus suggested that the young of a tribe will be expelled and go searching for their own space and provisions. "And when they fell in with any tribes like their own, the contest was a struggle for existence, and they fought with a desperate courage, inspired by the rejection that death was the punishment of defeat and life the prize of victory."[11]

The Levers of Power

What kind of country was Britain in the eighteenth and early nineteenth century? Since the Act of Union of 1707, England (and Wales) and Scotland were one country, although with differences especially in law. (The two countries had shared the crown since 1603.) The Glorious Revolution pushed the country toward democracy, and this

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was crucially important. But it must be allowed that it was hardly a democracy in a sense that we would understand or appreciate. The powerful aristocrats (remember, usually members of the Whig party) balanced the throne and its supporters—the earlier-mentioned smaller landowners (squires) and military and clergy—and these noblemen held much power both in the House of Lords (where they sat by hereditary right) and the House of Commons (where they sent members who were chosen by them and beholden to them). This meant that such political power was in the hands of men who were usually rich because of owning many acres, and that (especially since the other side tended to be even less sympathetic) the men of industry and commerce were too often excluded from the great decisions of state. New growing towns and cities like Birmingham had no members of parliament, whereas some rural ridings with very few inhabitants ("rotten boroughs") returned members chosen by the aristocratic patrons. Of course in reality there was much more movement of power and interest up and down the classes—mention was made earlier of the fact that the interests of the landowners were often at one with the interests of the industrialists—but it was not until 1832 that the first of the Reform Acts was enacted, starting the real redistribution of power among the classes of the country.

Interestingly from our perspective this did not necessarily spell improvement as we might judge it. With the move to cities, with men and women plying for work in a personally indifferent market, with growing distances between masters and employees—no longer did one have the traditional squire-yokel relationship—those newly empowered were keen to keep the poor rates to a minimum. So great new workhouses were erected, intended to keep together soul and body, but to be so unpleasant that the indigent would do all in their powers to avoid falling for mercy on the state. Shades of *Oliver Twist* (first published in book form in 1838)! Although many, especially the newly empowered industrialists, would have derided such sentimentality and argued that the Malthusian facts speak for themselves. The population of England doubled between 1781 (about 7 million) and 1831 (about 14 million). Glasgow grew from 62,000 in 1791 to 202,000

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in 1831; Manchester from 30,000 pre-1800 to 182,000 in 1831; and Birmingham from 42,000 in 1778 to 144,000 in 1831. London from a million and a quarter in 1801 to over 2 million in 1831.[12] Industrialists were often torn over facts such as these. On the one hand, they necessitated heavy payments to support the indigent. On the other hand, they offered ready supplies of very cheap labor. It is noteworthy how one and the same person could be dreadfully upset by the export of African slaves to the New World, and yet indifferent to the needs of the poor of his own country. Josiah Wedgwood founded the great pottery works, and he and his family were leaders in the fight against the slave trade. Famously he produced a medallion of a chained slave imploring, "Am I not a man and a brother." As famously, speaking of his own workers, his avowed aim was "to make such machines of the men as cannot err." Of their taking time off to go to fairs, he threatened, "I would have thrashed them right heartily if I could."[13]

What of the role of religion in all of this? On coming to the throne in 1558, Elizabeth—"Good Queen Bess"—had fixed Britain as a Protestant country, and for all of the troubles with proselytizing Jesuits and rambunctious Puritans, not to mention the horrors of the civil war in the middle of the seventeenth century and the appearance of dissenters like the Baptists and the Quakers, by the beginning of the eighteenth century the Established Church of England, the Anglican Church, was firmly in control. It was said that the Church of England was (government-appointed Whig bishops aside) the Tory party at prayer. There was good reason for this, for time and again the local incumbent was a brother or younger son or other close relative of the local landowner, and being given a (lifetime) tenancy of a parish was considered both socially and financially an appropriate role for a gentleman. Theologically the Anglican Church pointed to a comfortable conservative perspective—one that would have disdained a wild lurch to the right as much as it would have deplored the left-wing movements of the twentieth century. The "Elizabethan Settlement" or "Compromise," steering between the authority claimed by the Catholic hierarchy and sola scriptura of the Calvinists, put a heavy emphasis on traditional forms, on stability, on the paternalistic obli-

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gations of those in authority. Often it was leading Tory laypeople who were the leaders in shortening the workday and preventing use of women and children for the worst kind of labor.

Not for the Anglicans were the speculative flights of continental thinkers—Schleiermacher and a feeling of "absolute dependence" and that sort nonsense—but a comfortable empirical approach to the mysteries of creation, as expounded above all in the turn-of-the-nineteenth-century textbooks of Archdeacon William Paley of Carlisle (figure 1). With respect to revealed theology, in *A View of the Evidences of Christianity*, Paley assured us that the willingness of the disciples to die for their faith confirms the authenticity of the Gospel miracles and hence the divinity of Christ.[14] With respect to natural theology—an Anglican favorite since the sixteenth century—there was to be no intellectual chicanery with flashes of unsound Cartesian brilliance like the ontological argument.[15] It is all a matter of design; although it is revealing how Paley in his *Natural Theology* showed his own old-fashioned roots by seizing on a watch as the paradigmatic example of intelligence at work.[16] No matter. So complex and functioning an entity cannot have been formed by chance. Likewise does the eye bear testimony to a designer as much as does a telescope. There has to be a good all-powerful God. One who has ordered society as it is and with which we should not mess.

Providence versus Progress

There were winds of change. Science, for all of Galileo's troubles, was almost always done by sincere believers, but increasingly it made improbable many of the more outlandish claims about the supernatural. And foreign travel, especially to the East, opened many an eye wider than hitherto thought possible. Inhabitants of these lands were not all savages, they had sophisticated religions of their own, and not a murmur could be found of the doings of Jesus of Nazareth! Could it be that Christianity was not true? There were two responses to this question.[17] One to draw the line. The rot had gone far enough and must be stopped. The heart must rule the head. In England, and then of course increasingly across the Atlantic, we have the Method-

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ists. The message was simple: "Believe and ye shall be saved." For all that John Wesley, the leader, was an educated man, he did not find salvation while exploring the friendly fields of English natural theology, nor did he walk through these with the thousands who flocked to hear his message. His heart was "curiously warmed," and the same was true for the many that followed him. The other response was to follow on down the path of reason and empirical evidence. To let the head have full sway. This did not, at least this did not in Britain, lead at once to ardent atheism. There was no proto Richard Dawkins. But on both revealed and natural theological grounds people did start to have doubts, and there was a move to what is known as "deism." This is the idea of God as an unmoved mover, who set the world in motion and now sits back and watches his handiwork. It is distinguished from "theism," generally a term restricted to the Abrahamic religions (Judaism, Christianity, and Islam) where God is immanent and willing and able to intervene in His creation. A world, that is, of miracles.

How can one best characterize the two world pictures? Of course, there were all sorts of debates about reading the Bible, but the fights that we see today in America over literalism were not really the focus of difference. These fights are very much the end points of theological inventions in the New World in the nineteenth century. It is more profitable to cast matters in eschatological terms. For believers, the key notion is that of a Providential God. This is a God who will guarantee salvation and eternal life if only one believes and lets one's sins be washed away by the Blood of the Lamb. This is an evangelical religion, and although it is very much a characteristic of Protestant non-Anglicans (nonconformists or dissenters), it spread up and captured many members of the established church—not all of whom were quite as vile and unctuous as Trollope's Obadiah Slope (the personal chaplain of Bishop Proudie in *Barchester Towers*). The Anglican evangelicals were among the leaders of the move against slavery. So it was not a theology of nonaction, but of recognition that standing alone one was doomed to failure.

Opposing Providence was Progress.[18] This is the belief that one can make the Kingdom of Heaven (literal or metaphorical) here on Earth, through one's own unsupported reason and good will and

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efforts. Education, technology, medicine, agriculture, politics—all can be made better by men and women using their powers properly. Note that it is just as human-focused as is Providence. It is rather that the means to glory are very different. It is well know that, in France, Progress became the philosophy of the day, particularly among the so-called philosophes. It was against one of the leaders of the movement, the Marquis de Condorcet, that Malthus first penned his gloomy reflections on population. But for all of the doubters like Malthus—significantly an ordained member of a Christian church—there were many who saw and reflected on the great strides made in eighteenth-century Britain and who were convinced that this was no contingent phenomenon but a pointer to the possibilities and actualities of genuine, lasting improvement for all. In fact, even Malthus himself was not entirely against something akin to Progress. His discussion was framed within a natural theological context, where he saw the struggle as God's way of getting us to take the initiative and try to better ourselves.[19]

And So to Evolution

It is at this point that our story starts to turn toward evolution, the natural development of plants and animals from forms very different and much simpler, perhaps originally from just a few forms that may themselves have developed from inorganic materials by natural—that is, law-bound—causes. In Britain, the first genuine, full-blown evolutionist was the physician Erasmus Darwin (figure 8), grandfather of the hero of our tale, Charles Darwin. This first Darwin, educated in Edinburgh, was no mere country doctor. From the British Midlands, he was at the heart of the new industrialism, friend of some of the greatest movers, himself an inventor and minor scientist, and ardent member of the Lunar Society, a group who gathered once a month in Birmingham to discuss ideas and plans of mutual concern and interest. He was also a poet, much given to expressing his ideas in (what we today rather judge as) not exactly stellar verse. Be this as it may, it is here that we find some of his most elaborate evolutionary effusions.

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Imperious man, who rules the bestial crowd,
Of language, reason, and reflection proud,
With brow erect who scorns this earthy sod,
And styles himself the image of his God;
Arose from rudiments of form and sense,
An embryon point, or microscopic ens![20]

Erasmus Darwin's speculations were not based on empirical evidence. He had had some experience of fossils when tunnels were being bored for canals, but overall his knowledge of facts pertinent or otherwise was minimal, to give a generous assessment. From where then came his enthusiasm for evolution? The fact that we humans are so firmly the end point gives the clue. For Erasmus Darwin, the idea of Progress in the sociocultural world translated itself as evolution in the organic world. Darwin was fanatical about Progress. A good friend of Benjamin Franklin, he was an ardent supporter of the Americans in their break with the home country and, until things started to go dreadfully wrong, was no less enthusiastic about the French revolutionaries. Expectedly as a member of the Lunar Society, he was all in favor of technological change, in verse celebrating the triumphs of his fellow men of business and industry:

So with strong arm immortal BRINDLEY leads
His long canals, and parts the velvet meade.[21]

Explicitly and categorically he drew a parallel between the upward path of culture and that of biology, the two notions really being but one. The idea of organic progressive evolution "is analogous to the improving excellence observable in every part of the creation; . . . such as the progressive increase of the wisdom and happiness of its inhabitants."[22]

The Fall and Rise Again of Evolution

The point to be made is that for Erasmus Darwin, the idea of organic evolution was an epiphenomenon on the culture—the British cul-

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