

Prologue

In 1859, the English naturalist Charles Robert Darwin published his epoch-making work *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life* (Darwin 1859). At once, his old friend and mentor Adam Sedgwick, ordained Anglican minister and Professor of Geology at Cambridge University, wrote:

If I did not think you a good tempered & truth loving man I should not tell you that, (spite of the great knowledge; store of facts; capital views of the corelations of the various parts of organic nature; admirable hints about the diffusions, thro' wide regions, of nearly related organic beings; &c &c) I have read your book with more pain than pleasure. Parts of it I admired greatly; parts I laughed at till my sides were almost sore; other parts I read with absolute sorrow; because I think them utterly false & grievously mischievous.

(Letter from Sedgwick to Darwin, 24 November 1859, Darwin Correspondence Project – DCP-LETT-2548))

The next year, 1860, at the annual meeting of the British Association for the Advancement of Science, at Oxford, Bishop Samuel Wilberforce, high Anglican Bishop of Oxford (and son of William Wilberforce of slave-trade-abolition fame), squared off against Darwin's bulldog Thomas Henry Huxley, a professor at the Royal School of Mines. Supposedly, the bishop asked the professor if he was descended from monkeys on his grandmother's side or his grandfather's side; the professor replied that he had sooner be descended from a monkey than from a bishop of the Church of England. All rather exaggerated and one of those good tales where there is more truth in fiction than in fact (Lucas 1979).

Across the Atlantic, Swiss-born Harvard professor Louis Agassiz, Unitarian, wrote to Charles Darwin: 'It is true that I am and have been from the beginning an uncompromising opponent of your views concerning the transmutability of species, it is equally true that I hold these views as mischievous, because they lead to a looseness of argumentation which it has been the aim of the great naturalists of our age to eliminate' (Agassiz 1885, letter of 22 July 1868). In the same vein, Charles Hodge, the principal of the Princeton Theological Seminary, wrote a book published in 1874 with the title *What Is Darwinism?* At the end of the book, he answered his own question: 'What is Darwinism? It is atheism' (Hodge 1874, 177). This was a tradition that flourished. It is little wonder that, as the century went by, books were being published with titles like *History of the Conflict Between Religion and Science* (Draper 1875) and *History of the Warfare of Science with Theology in Christendom* (White 1896).

The pattern was set. On the one side, the religious – especially those with literalist yearnings. The 'Creation Scientists' wrote books – Duane T.

Gish's (1973) *Evolution: The Fossils Say No!* was an immediate bestseller – debated evolutionists – usually with much success because they were adept at making your average scientist lose his temper and look silly – and went after their opponents. Henry M. Morris – co-author of the seminal *Genesis Flood* (Whitcomb and Morris 1961) – in a review of one of my books, in a tone more pitying than critical, concludes: 'One thing he does not do, however, in any of his books, is to prove macroevolution, or even to show it to be as probable as creation' (Morris 1999, n.p.). On the other side were the scientists – today, especially those part of or sympathetic to the so-called New Atheists. In *The God Delusion*, Richard Dawkins says, 'Faith is an evil precisely because it requires no justification' (Dawkins 2006, 308). Jerry Coyne, an eminent (and enthusiastic) Darwinian evolutionist, spoke for many when he described the *Origin* as the 'greatest scripture killer ever penned', continuing that 'science and religion are engaged in a kind of war: a war for understanding, a war about whether we should have good reasons for what we accept as true' (Coyne 2015, 20).

Expectedly, not everyone feels or has felt this way. Charles Darwin strongly eschewed claims about warfare and incompatibility. Obviously, he saw that his thinking was going to impinge on some views that religious people do or have taken seriously, and he was not beyond thinking that there can be tensions. However, his major difficulties with religion were theological, not scientific. He hated the idea that people might be condemned for their honest beliefs. 'I can indeed hardly see how anyone ought to wish Christianity to be true; for if so the plain language of the text seems to show that the men who do not believe, and this would include my Father, Brother and almost all my best friends, will be everlastingly punished. And this is a damnable doctrine' (Darwin 1958, 87). Generally, Darwin thought that science and religion can and should go their various ways. His closest personal friend was Brodie Innes, the local Anglican vicar. Late in life, after retirement, the man of God wrote to his friend, the man of science: 'I must say I am indebted to you for much confirmation of the view . . . that Science and Religion should go on separately, and not contest in any way' (letter from Innes to Darwin, 1 December 1878, DCP-LETT-11768). Darwin made it very clear that he was simply not interested in attempts to reconcile science and religion. To a correspondent who was trying to arrange a conference demonstrating the compatibility of science and religion, he wrote: 'I can see no prospect of any benefit arising from the proposed conference' (letter to W. R. Brown, 18 December 1880).

It is these, and other, different perspectives on the science–religion relationship, specifically the evolution–Christianity relationship, that I want to consider in this Element. The structure of what follows is straightforward. We begin with a brief history of evolutionary thinking, looking at its beginnings, at the contribution of Charles Darwin and then of later developments – scientific

and cultural – of his ideas. We shall see that two root metaphors, the world-as-organism and the world-as-machine, have a crucial role to play in this account. We move next to the basic claims of Christianity. In this section, as in the first, the discussion is intentionally entirely non-judgemental. Third, we shall look at the interactions, actual and possible, between the claims of Sections 1 and 2.

To conclude, in a brief Epilogue, I shall refer to a well-known, fourfold division of possible science–religion relationships proposed by the physicist-theologian Ian Barbour (1990): (1) *conflict*, where both sides ‘claim that science and theology make rival literal statements about the same domain, the history of nature, so that one must choose between them’ (Barbour 1990, 4); (2) *independence*, where ‘[p]roponents of this view say there are two jurisdictions and each party must keep off the other’s turf. Each must tend to its own business and not meddle in the affairs of the other’ (Barbour 1990, 10); (3) *dialogue*, where ‘[t]he aim should be ‘consonance but not direct implication’, which implies that in the end the two sets of assertions are not, after all, totally independent’ (Barbour 1990, 16); and (4) *integration*, where this ‘final group of authors holds that some sort of integration is possible between the content of theology and the content of science’ (Barbour 1990, 23). These divisions are not to be taken as gospel, as one might say; they are also not to be taken as Newtonian, as one might equally say. But they will help to put things in perspective.

As we set out, I want to reveal – stress – what I believe is the key to understanding the relationship between Christianity and evolution, Darwinian evolution in particular. The latter is the offspring of the former – some would say the illegitimate offspring of the former. Darwin’s theory of evolution could not have existed without the Christian religion. Idea after idea, concept after concept, puzzle after puzzle starts with Christianity; Darwin’s theory takes them up, incorporates them and tries to give its own secular explanation. In suggesting the word ‘illegitimate’, I do not intend negative connotations. Rather, I point to the undoubted fact that the emergence of Darwinian thinking was not the intent of Christian thinkers or always entirely welcomed by them. This, however, is the truth and we must understand the implications.

1 Evolution

Root Metaphors

The start of the Scientific Revolution, that major change in worldviews that occurred in the sixteenth and seventeenth centuries, is usually dated from 1543, when the Polish cleric and astronomer Nicolaus Copernicus published *De revolutionibus orbium coelestium – On the Revolutions of the Heavenly Spheres* – in which he argued that the Earth goes around the sun (celestial motion) rather than

the sun around the Earth (terrestrial motion). The end is usually dated from 1687, when the English physicist Isaac Newton published *Philosophiæ Naturalis Principia Mathematica* – *Mathematical Principles of Natural Philosophy* – in which he showed that his theory of gravitational attraction could explain the main claims of the Revolution, in particular the celestial laws of planetary motion of Johannes Kepler and the terrestrial laws of bodies in motion of Galileo Galilei. This all said, the general opinion of historians of those great events is that the real change is one of what linguists call ‘root metaphors’, basic conceptual frameworks akin to Thomas Kuhn’s (1962) ‘paradigms’, from the world seen as an organism – *organicism* – to the world seen as a machine – *mechanism* (Hall 1983; Dijksterhuis 1961).

Plato in the *Timaëus* set the scene for the organic model or metaphor. Explicitly he argued that the Creator, the Demiurge, also the Form of the Good, moulded the universe on the lines of an organism: ‘he put intelligence in soul and soul in body, and framed the universe to be the best and fairest work in the order of nature, and the world became a living soul through the providence of God’ (*Timaëus*, in Cooper 1997, 30b–c). Aristotle did not, could not, see the world as an organism created or designed by God. Apart from anything else, his Unmoved Mover spends all eternity contemplating its own perfection – remind you of some teenagers you know? – knowing nothing of the physical world (Sedley 2008). But Aristotle was no less an organicist than Plato, seeing all things striving to the Mover, to perfection. Well known is his discussion of causation, distinguishing ‘efficient causes’ – the hammer striking the nail and making the sound – from ‘final causes’ – the nail being driven in in order to build the house. We are going from causes about the past and present to causes about the future. Today, this way of conceptualizing things is generally called ‘teleological’. This kind of thinking was embraced by the great Christian philosophers/theologians, notably Augustine and Aquinas.

By the end of the Middle Ages, with the rise of machines – particularly clocks and pumps – the metaphor was running out of steam, to use an appropriate image. People started to think in terms of systems working according to eternal, unbroken laws. To quote the great chemist 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, and the motions of the little statues that at such hours perform these or those motions do not require (like those of puppets) the peculiar interposing of the artificer or any intelligent agent employed by him, but perform their functions on particular occasions by virtue of the general and primitive contrivance of the whole engine.

(Boyle [1686] 1996, 12–13)

While there might be design, final cause, within the system – the valve is there in order to control the escape of the steam – overall there is no meaning or purpose. In the words of the English philosopher Francis Bacon, final causes are akin to Vestal Virgins – beautiful but sterile.

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With the change in root metaphors came a change in theological perspectives. Hitherto, God had been hovering over His creation, and all value came directly from him. *Providence!* Away from the Creator, nothing we can do has any meaning.

When I survey the wondrous cross
 on which the Prince of glory died,
 my richest gain I count but loss,
 and pour contempt on all my pride.
 (from the hymn ‘When I Survey the Wondrous
 Cross’, Isaac Watts 1707)

Now the emphasis changed to us doing things for ourselves. The laws of nature are there. They make things work. Now get on with it. From providence, we arrived at *progress*. And with this came evolutionary speculations, the thought that organisms might not have been created in one fell swoop by a hands-on Creator but have come naturally through the working of unbroken law. From a providential view of origins to a progressivist view.

In one sense, the move to evolution was no great surprise. From the time of Aristotle, people had accepted the idea of a ‘chain of being’, that organisms could be assigned to a level on an upwards scale or ladder (Lovejoy 1936; see also Figure 1). Although static, it fitted in nicely with the organicist vision, from lowly acorn to mighty oak. We had a rise from the lowliest forms to the highest, human beings, and if one was so inclined one could keep going through the orders of angels until one reached God. Now with the idea of progress, with laws moving everything, rather than intervening Providence, we have an escalator rather than a staircase. In the middle of the eighteenth century, we find the French man of letters Denis Diderot, who combined a happy career of writing pornographic novels about lesbian nuns with floating speculations about natural origins (Ruse 2005). More staid, but as committed to such ideas, was Charles Darwin’s grandfather, Erasmus Darwin, who hymned evolution in prose and verse.

Organic Life beneath the shoreless waves
 Was born and nurs’d in Ocean’s pearly caves;
 First forms minute, unseen by spheric glass,
 Move on the mud, or pierce the watery mass;



Figure 1 The great chain of being – God, angels, heaven, humans, beasts, plants, flame, rocks – from Ramon Lull’s *Ladder of Ascent and Descent of the Mind*, 1305

These, as successive generations bloom,
 New powers acquire, and larger limbs assume;
 Whence countless groups of vegetation spring,
 And breathing realms of fin, and feet, and wing.
 Thus the tall Oak, the giant of the wood,
 Which bears Britannia’s thunders on the flood;
 The Whale, unmeasured monster of the main,

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The lordly Lion, monarch of the plain,
 The Eagle soaring in the realms of air,
 Whose eye undazzled drinks the solar glare,
 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 embryo point, or microscopic ens!
 (Darwin 1803, vol. 1, 11, ll. 295–314)

Explicitly, Erasmus Darwin tied his evolutionary biology in with his progressivist philosophy of life. 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’ (Darwin [1794–6] 1801, vol. 2, 247).

In the age of Newton, some thought had to be given to causes. Erasmus Darwin more or less assumed an internal motion upwards, as with organic growth – acorn to oak – but he added a secondary mechanism, one that goes back to the Old Testament, the inheritance of acquired characteristics. A decade or so later, this secondary mechanism was adopted by the French systematist Jean Baptiste de Lamarck, the most famous of all the pre-Charles Darwin evolutionists. Indeed, it goes by his name, ‘Lamarckism’; although, as with Erasmus Darwin, it is a secondary mechanism to the internal forces pushing organisms ever up the scale (Burkhardt 1977). Not that either was received with unalloyed approval. Lamarck was opposed in France by the most famous biologist of his age, Georges Cuvier, and in England by just about every leading scientist. In 1844, anonymously, the Scottish publisher Robert Chambers had produced an evolutionary tract, *Vestiges of the Natural History of Creation* (Chambers 1844). Fire descended upon him, from Adam Sedgwick in Cambridge, from David Brewster, a physicist from Scotland, and from William Whewell, a scientist (he worked on the tides), historian and philosopher of science, and a powerful university administrator; he was master of Trinity College, Cambridge (Secord 2000). To be candid, Chambers did not have a great deal of new information, but he did make strongly the point about progress.

A progression resembling development may be traced in human nature, both in the individual and in large groups of men Now all of this is in conformity with what we have seen of the progress of organic creation. It seems but the minute hand of a watch, of which the hour hand is the transition from species to species. Knowing what we do of that latter transition, the possibility of a decided and general retrogression of the highest species towards a meaner type is scarce admissible, but a forward movement seems anything but unlikely. (Chambers 1846, 401–2)

Charles Darwin

It was to be another fifteen years before the *Origin* was published, but already privately it was well on the way (Browne 1995). Charles Darwin (1809–82) came from a rich, upper-middle-class family. His maternal grandfather was Josiah Wedgwood, the potter, and one of the most successful businessmen of his day. More family money came from this source when he married his first cousin, Emma Wedgwood. Educated first at an English private ('public') school, followed by an abortive attempt to study medicine at Edinburgh, Darwin ended up at the University of Cambridge, intending to become an Anglican clergyman, a respectable position for a rather aimless man with a good private income. However, his talents as a biologist were spotted by mentoring faculty (including the Professor of Botany, John Henslow, as well as Sedgwick and Whewell) and in 1831 he got the offer to go as ship's naturalist on HMS *Beagle*. He was to spend five years mostly mapping the coast of South America – a major market for British industrially produced goods – ending by going all the way around the globe before returning to England. Darwin did not become an evolutionist on the trip; but when, on his return, a leading taxonomist assured him that the different kinds of birds he had captured on the Galapagos Archipelago in the Pacific were indeed different species, he crossed the divide. It made no sense that independently created, but similar species had by coincidence found their ways to adjoining islands. Especially since they were all so similar to birds on the nearest mainland (and not at all to Africa). It had to be (what Darwin was to call) 'descent with modification' and – as a private notebook entry shows – it implies that all of nature is connected on a tree of life (see Figure 2).

It was still the age of Newton – Whewell was fanatical – and so causes had to be sought. The chief one, natural selection, was discovered at the end of September 1838. (Darwin kept detailed notebooks so we can follow his enquiries and speculations.) Britain's Industrial Revolution had started in the eighteenth century. Such a revolution demands a parallel agricultural revolution. People are leaving the land to move to factories in cities – fewer to produce the food – and, once the move has been made, there is a priority on large families because children can do work on machines that is impossible for adults – more mouths to feed. Hence, there must be improved ways of producing food and selective breeding, animals and plants, is an obvious and powerful option. Darwin came from Shropshire, the heart of rural England, so he knew much about breeding, especially given that his uncle Josh (son of the first Josiah Wedgwood and father of Emma) was a gentleman farmer. Unsurprisingly, Darwin – who read quickly and widely – seized on selection as a possible