



Taking Darwin Seriously¹

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Nothing in biology makes sense except in the light of evolution.

Theodosius Dobzhansky² (1973)



Genesis

Let me grasp this nettle at the outset, and trust no-one is offended. I take neither Genesis 1–2:3 nor Genesis 2:4–end 3 as talking cosmology and paleobiology.³ (Anyway they cannot both be successfully doing so, since they are radically inconsistent.) In fact, I am among those who suspect that the very idea of scientific accounts, in either cosmology or paleobiology, only formed itself in the European mind during the Renaissance. Instead: ‘In the ancient world, cosmogony was a therapeutic rather than a factual genre. People recited creation myths at a sickbed, the start of a new project, or the beginning of a new year’.⁴

On my reading of biblical scholarship, Genesis 1 was composed ca. 580 BCE, beside the waters of Babylon, as their priests’ reassurance to the Hebrew exiles that their God’s influence had not been left behind in Judea. The usual Mesopotamian creation myths involved a god’s titanic struggle against evil forces. In Genesis 1’s uniquely peaceful account, the priestly author was enjoining his hearers to trust and worship their God even though they were away from home, to admire His whole creation, and love all human kind.⁵ He was not dictating a scientific history. That is a matter for science itself.



Evolution before Darwin

Clandestine ideas about what we now call ‘evolution’ (‘descent with modification’ was the earlier term) were being formulated in France in the mid-eighteenth century. They surfaced particularly in the writings of **Jean-Baptiste de Lamarck** (late 1790s) – though his proposed mechanism for the evolution he described was shaky. In Britain, **Erasmus Darwin** (Charles’ grandfather) even proposed in verse that descent with modification was of the essence of biological history! But he offered no suggestion as to the mechanism.



Geology

Two Scots, **James Hutton**, a Berwickshire farmer, in his *Theory of the Earth* (1785), and **Sir Charles Lyell** (Angus), with the three-volume *Principles of Geology* (1830–33), pioneered this science. The working hypothesis, implicit in Hutton and explicit in Lyell, was that the processes affecting the earth today have always been the active influences. Such ‘Uniformitarianism’ implied that the earth must be *hundreds* of million years old – ‘Deep time’. This, not evolution, was the most direct challenge to scriptural literalists.

A specific group, subsequently referred to as ‘**Scriptural Geologists**’ (all very amateur!) insisted that the scriptures were *dictated* by God. The inferences of their opponents were ‘drawn in the teeth of this authenticated *fact*, that “in six days the Lord made heaven and earth”!’⁶ To achieve the stratigraphic record in about 6,000 years, laws of physics must have been ‘100 times or more’ faster than they are now. (It would actually need at least a million times.)

By contrast, **Thomas Chalmers**, mathematician and theologian – who has been called ‘Scotland’s greatest nineteenth-century churchman’,⁷ and whose first great charge was the Tron Church in Glasgow – wrote as early as 1804:

It has been alleged that geology, by referring the origin of the globe to a higher antiquity than is assigned to it by the writings of Moses, undermines our faith in the inspiration of the Bible

[...]. This is a false alarm. The writings of Moses do not fix the antiquity of the globe.⁸

Later, as the holder of an Edinburgh chair, he lamented that:

[...] while the most respectful caution, and humility, and steadiness, are seen to preside over every department of moral and physical investigation, theology is the only subject that is suffered to remain the victim of prejudice [...]⁹

A fascinating halfway figure was **Hugh Miller**, a self-educated stonemason from Cromarty. His *Testimony of the Rocks* (1857) adopted the ‘day-age’ theory (first proposed in France fifty years earlier): ‘I have been compelled to hold that the days of creation were not natural, but prophetic days, and stretched far back into the bygone eternity’.¹⁰ But he strove to correlate geological and scriptural sequences. Thus, for him:

The **Carboniferous** (the era of the great plants) = Day 3 of Genesis 1 – ‘And the earth brought forth grass, and herb [...], and the tree yielding fruit’.

The **Oolitic and Cretaceous** (reptiles and birds) = Day 5 – ‘God created [...] every living creature that moveth, which the waters brought forth [...], and every winged fowl’.

The **Tertiary** (mammals and humans) = Day 6 – ‘God said, Let the earth bring forth the living creature after his kind, cattle, and creeping thing, and beast of the earth [...] and man in his own image [...] male and female created he them’.

And the work of the **current epoch** (Day 7) is moral improvement and redemption.

But, for Miller, all acts of species-creation are still separate divine interventions. The ground was prepared, but the greatest insight still awaited. Some fifty years earlier, **Cuvier**, the eminent French palaeontologist, had exclaimed: ‘why may not Natural History one day have her Newton?’¹¹ Just two years after Miller, *The Origin of Species* would be published, and humanity’s view of its world be changed forever.



Darwin's own theology

Darwin's vision was a Grand Design. Not 30 million separate species (and an untellable number of intermediate forms) but an overall scheme of fecundity and endless variation: one majestic edifice of *really* 'Intelligent Design'! The final paragraph of *The Origin* pictures a tangled bank, crowded with interacting and often mutually dependent species (plant and animal).

There is grandeur in this view of life, with its several powers, having been originally breathed by the Creator into a few forms or into one; and that, while this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful have been, and are being, evolved.¹²

Equally significant was an opening quote from the philosopher of science **William Whewell**, an older contemporary: 'we can perceive that events are brought about, not by insulated interpositions of Divine power, exerted in each particular case, but by the establishment of general laws.'¹³

It is true that Darwin had lost his faith in an always-benevolent God, but this was less a deduction from his biology than the result of a long, anguished vigil at the death-bed of his beloved eldest daughter, aged 11. His science prevented his accepting the literal truth of Genesis 1–3 and he became agnostic about all dogma, but he did a lot of work for his local church and remained a theist all his life. Just four years before his death he wrote to an enquirer: 'It seems to me absurd to doubt that a man may be both an ardent Theist and an Evolutionist. [...] In my most extreme fluctuations I have never been an atheist in the sense of denying the existence of a God.'¹⁴



Natural selection

Darwin's key contribution, indicated in the full title of *The Origin*, was to propose a *mechanism* for evolution – 'Natural Selection'. Where there are differences between individuals, those better suited

to the environment at a particular place and time tend to produce more offspring; if the differences are inherited, gradually their characteristics become dominant. It's not just a matter of individual 'fitness', but of *reproductive* fitness.

This process is inevitable: *natural selection cannot not occur!*
The questions were (and are):

- 1) whether natural selection can explain all it was proposed to explain
- 2) whether the variations upon which it acts were undirected ('chance')
- 3) whether even geological time had been sufficient for complex creatures to evolve.

I shall return to these.

The Origin is an extraordinarily cautious presentation of painstakingly collected and meticulously recorded facts, gently and modestly pointing to a conclusion which those facts make inescapable to any even-slightly scientific mind. The crudely assertive belligerence of Darwin's more bigoted opponents is poignantly out of keeping with the temper of the work for which they display such usually-ignorant hatred. 'Few books have been more widely misunderstood and misinterpreted than *The Origin of Species*, especially by those who have not read it.'¹⁵



Supportive reactions

Reactions were emphatic on both sides. Whether among scientists or churchmen, almost no-one who committed himself to manuscript or print took a moderate view. But here I pick out two Victorian responses as models for our own assessment. **Charles Kingsley** – parson-naturalist, novelist, historian – wrote in acknowledgement of a pre-publication copy: 'I have long since, from watching the crossing of domesticated animals and plants, learnt to disbelieve the dogma of the permanence of species [...].'¹⁶ And later in another letter: 'Now that they have got rid of an interfering God – a master-magician as I call it – they have to choose between the absolute empire of accident and a living, immanent, ever-working God.'¹⁷

‘The absolute empire of accident’ is still, of course, the atheist view, but savour Kingsley’s alternative: ‘*A living, immanent, ever-working God!*’

A common way to accommodate scientific and religious outlooks, since the eighteenth-century Enlightenment, had gone under the name of ‘Deism’. Newton, though himself wholly imbued with a sense of God sustaining everything, had offered equations which, to those of different disposition, seemed able to account for all events: deists therefore held that God had wound the clock, then let it run. A generation after Kingsley, the Oxford Anglo-Catholic theologian **Aubrey Moore** saw Darwinism as a counter to this:

The one absolutely impossible conception of God, in the present day, is that which represents Him as an occasional visitor. Science had pushed the deist’s God farther and farther away, and at the moment when it seemed as if He would be thrust out altogether, Darwinism appeared, and under the disguise of a foe, did the work of a friend. It has conferred upon philosophy and religion an inestimable benefit, by showing us that we must choose between two alternatives. Either God is everywhere present in nature, or He is nowhere.¹⁸

Moore also welcomed Darwin’s alternative to the separate creation of each species:

Apart from the scientific evidence in favour of evolution, *as a theory* it is infinitely more Christian than the theory of “special creation”. For it implies the immanence of God in nature, and the omnipresence of His creative power. Those who oppose the doctrine of evolution in defence of [occasional interventions by] God, seem to have failed to notice that a theory of occasional intervention implies as its correlative *a theory of ordinary absence*.¹⁹

Compare this with the wonderful remark of **Einstein**:

There are only two ways to live your life. One is as though nothing is a miracle. The other is as though everything is a miracle.



An echo of the earliest Christianity

I see Moore as returning to the very earliest Christianity – before the doctrinal councils presumed to debate the dual nature of Christ, the internal life of the Trinity, etc; before the great creeds which followed; and before the Augustinian view of God as creating the world from outside (*‘ab extra’*). As Crawford Knox put it, for those early Christians,

God is [...] much more than first cause for he is also sustainer of the universe and will bring it to fruition: to speak of the Creator is thus to speak, not just of beginnings but of the entire world process from beginning to end.²⁰



Levels of operation

A twenty-first century perspective on the concept of immanence must address the ‘how’ question of God’s interaction with the world. Considering this, I start with a phrase frequently used by **Sarah Coakley**, the wonderful lady who has been lured back from Harvard to the senior Chair of Divinity at Cambridge. She speaks of *‘flat plane’* thinking – the assumption, pervasive in Neo-Atheism, that God’s involvement in Creation is of the *same sort* as a scientific account of events. On the contrary, she writes: ‘God does not compete for space with individual events studied by the scientist.’²¹



Computer analogy

If the plane is not flat, we must think instead of *different levels of explanation*. I have long tried to illuminate my own version of this concept by inviting people to think of the PCs, desktop or laptop, which nowadays both aid and complicate their daily lives.

Consider Jane, typing next Sunday’s sermon, or John, using a spreadsheet to analyse whether he can afford a new car. The operations of their computers can be described at many levels. One extreme would be that of the solid-state physicist, describing the behaviour of electrons and positive holes in the computers’ micro-circuits; the other

would be those of Jane and John, operating the keyboards of their respective machines. The physicist could describe minute currents, flicking to and fro in the silicon circuitry. But he would simply note, not explain, critical changes in the operation of certain components. By contrast, Jane and John know nothing of the electrons and positive holes, but they do know that they tapped specific keys.

You will see that, in my analogy, the physicists are place-holders for whatever scientist has the task of describing a particular process – in the case of an evolutionary change, it would be a geneticist or molecular biologist, recounting a recombination or mutation among the genes. And, to complete the analogy, Jane or John stand in for God.

NB: this is *only* an analogy. The machine's designer can perfectly well give a full account of how a key-stroke leads to the change of state of a transistor. In the science/religion field of the last thirty years, a lot of effort has gone into suggesting ways in which God might influence particular sorts of physical events – molecular events among the genes, synaptic changes in the brain, redirections of the jet stream or movements of tectonic plates. Many people look to the unpredictable micro-events of quantum theory; others to 'chaos theory' of large-scale happenings. These are candidates for what **Austin Farrer** (one of the greatest Anglican theologians of the twentieth century) called the '*Causal Joint*' by which God acts on the world. To locate this would place us in the position of the PC's designer. But, personally, I do not think human beings will ever locate the causal joint (or many joints?). I am pretty sure Sarah Coakley does not believe so either. But I do suggest that the computer user and solid-state physicist helpfully *model* what she means when she speaks of the '*contrasting planes*':

- 1) that on which the Creator operates
- 2) that on which **Richard Dawkins** can rightly claim to understand things.

Unlike Dawkins, Coakley does not think these are the same plane – and nor do I. Compare instead the comment of the French novelist, **Anatole France**: 'Chance is just the pseudonym of God, when He doesn't want to sign'. 'Chance' is how God's actions appear, on the 'flat plane' inhabited by Dawkins.



Directedness of evolution

I left hanging three questions earlier. There is very strong, though not unanimous, professional consensus that Natural Selection is the critical process (Question 1) and that geological time has been sufficient (3). But one has only to go a little way outside the mainstream to find serious workers questioning the orthodoxy that the variations on which Natural Selection works are totally undirected (2).

a) Late nineteenth century—many people (e.g. **Henry Drummond** in Scotland) maintained there was a steady drive to ‘progress’ (bodily and/or intellectual and/or moral). For Darwin himself, however, the fact of progress (which he did not question – his second great book was called *The Ascent of Man*) was not due to directed variations offered to Natural Selection, but cumulative consequences of that selection. The organisms which are better adapted for survival will go forward; the summed effect generally (though not always) = ‘progress’.

b) Late twentieth century/twenty-first century – several thinkers believe there *is* a drive, at least to organisation, and arguably to progress. I shall name two here.

Stuart Kauffman (1939–) is an American theoretical biologist and humanist, mainly working with computer models of non-biological systems. He contends²² that ‘Laws of complexity’ in the universe lead to the emergence of ‘order for free’ in systems ‘poised on the edge of chaos’ – an apposite description of Life!

Simon Conway Morris (1951–), an English Catholic palaeobiologist, is seized by the extraordinary repetition of patterns in the biological world, indicating what is termed ‘evolutionary convergence’. A standard example is that among the marsupial animals of Australia there are carnivores and herbivores, bears, burrowers and aquatic animals, all with striking similarities to their equivalents among the placental mammals of other continents.

Evolution is akin to an immense field of possibilities, but at widely scattered points there are deep wells to which biological forms are attracted. To trace the paths that evolution actually chooses [...] is of great interest, but more fascinating still is to see how the recurrence of design points to deep organizational principles.²³

This is imperfectly convincing to critics, for whom similar evolutionary niches will get filled in similar ways, wherever they occur. Yet Conway Morris is undeterred: his most recent book²⁴ argues that a trend toward conscious awareness is also evident. Comparing an aquatic invertebrate with a mammal, he points out that the octopus brain has many primate-like capacities, and its eye is so remarkably like ours that when we exchange its gaze we have as strong a sense of another conscious being as we have with a familiar horse or dog. But does this indicate a drive? Or, once again, is it just that a camera eye is easily developed, and that consciousness enhances prospects for survival and reproduction? The argument from convergence is alluring, but regrettably inconclusive.



A theological exponent of complexity thinking

Teilhard de Chardin (1881–1955) was a French Jesuit palaeontologist, banished to China for his unorthodox account of Original Sin. (There he was part of the team which discovered Peking Man.) For Teilhard, Christians ‘frightened for a moment by evolution’, could now see that it offered ‘a magnificent means of feeling more at one with God’.²⁵ He saw evolution as an expression of psycho-physical energy, with complexity ever-increasing, driving towards the ‘*Omega Point*’ of confluence with God.

Because of his Order’s prohibitions, Teilhard’s books were all published posthumously – the most important, *The Phenomenon of Man*, appearing in English in 1959. In it he pictures Life as drawn up through several ‘thresholds of complexification’, both biological and spiritual. The first was the creation of the cosmos from nothing – *Cosmogenesis* (he loved constructing long Greek words) – and the last, still to come about, would be *Christogenesis*, when life would develop from being world-centred to being Christ-centred. Each stage was a massive leap, preceded by a *state of biological super-tension*. For example, at the stage of Biogenesis, ‘life no sooner started than it swarmed’.²⁶

It is impossible not to compare this with both Conway Morris and Kauffman: Teilhard, like Conway Morris, refers repeatedly to evolutionary convergence, while a ‘threshold of complexification’

might be exactly the language of Kauffman, and a ‘state of biological super-tension’ surely implies a system ‘on the edge of chaos’? Yet for Teilhard, God draws, lures, illuminates by the power of love – He does not coerce. So evolution is becoming an increasingly indeterminate process. There is no hint of this idea in his scientific successors.

Ever since Aristotle there have been almost continual attempts to construct ‘models’ of God on the lines of an outside Prime Mover, acting *a retro*. Since the emergence in our consciousness of the ‘sense of evolution’ it has become physically impossible for us to conceive or worship anything but an organic Prime-Mover God, *ab ante*.²⁷

This Prime Mover surely operates on Coakley’s different plane from that of laboratory science? Teilhard’s thinking as a whole is not science, but it is not incompatible with science.



Modern endorsements of Teilhard

In recent Catholic thinking, Teilhard has been strongly rehabilitated: Joseph Ratzinger, before becoming Pope, and Pope Francis in the encyclical *Laudato si’*, both refer most favourably. But I shall quote from the American Franciscan sister and academic **Ilia Delio**:

[...] Teilhard reminds us that evolution is the openness of life to the future. We are an unfinished species, corporately and personally, grounded in an infinite depth of Love [...]. Christianity is a religion of personhood rooted in love; at least this was the core message of Jesus. It lost its personality early on when it adopted the Greek notion of soul and the supernaturalism of the divine. [...] We set our eyes on another world in hope that we could merit entrance into it. But we humans are not transients, renting a home in the cosmos until we can move to a more permanent one. Human life is not extrinsic to cosmic life, a strange species in an otherwise natural world. We are the latest arrivals in an evolutionary universe; we emerge from the whole and are integral to it.²⁸

Delio's critique tallies well with the situation of modernity perceived by the English (and I suspect Anglican) philosopher of religion Crawford Knox. In his assessment:

[For the early Christians,] God did not, [...] having created the world, seek just to maintain it in a static relationship. God was seen as essentially creative and the creativity of God demanded also an openness and responsiveness on the part of creation [...]. The need for openness to new insights [is] fundamental to the entire evolutionary process at all levels. [...] Yet that sense of the need for openness to the creativity and self-disclosure of God was largely lost by the Western churches and replaced by closed systems of belief. [The emphasis was now on] moral cleansing to allow entry of a distant God whose creative work was [...] complete and who now had the rather different task of redeeming man who had fallen from a prior perfect state.²⁹



The biggest challenge – the anguish inherent in Natural Selection

Those last two quotes open to us respects in which an evolution-based theology must rethink the assumptions of some eighteen centuries. Yet there is an even stronger reason, of which recognition grew quite early in the nineteenth century – well before Darwin. In a verse published nine years before *The Origin*, and conceived substantially earlier still, **Alfred Lord Tennyson** described his dead friend Arthur Hallam's having:

[...] trusted God was love indeed,
And love creation's final law,
Though Nature, red in tooth and claw
With ravine, shriek'd against his creed³⁰

However, Darwin himself was deeply affected by this problem: 'What a book a Devil's chaplain might write on the clumsy, wasteful, blundering, low and horridly cruel works of nature!'³¹

Surely **this, not evolution as such**, is the key challenge of biology to theology and theodicy? (Note, incidentally, that ‘Cosmic Fall’ claims won’t do – predation and extinctions can be found throughout the fossil record ... and dinosaurs had both arthritis and TB!) Yet evolution by Natural Selection presents a special challenge because, for it, predation, and the inescapable consequent suffering, are *necessary* mechanisms: suffering is *instrumental* in Natural Selection:

[...] from the war of nature, from famine and death, the most exalted object which we are capable of conceiving, namely, the production of the higher animals, directly follows.³²

Or, in a more modern statement:

Without predators to cull the herd, deer overrun their habitats and starve – all suffer, and not only the deer but the plants they browse and every other species that depends on those plants. In a sense the “good life” for deer, and even their creaturely character [...] depends on the existence of the wolf. [...] From the point of view of the individual prey animal predation is a horror, but from the point of view of the group – and of its gene pool – it is indispensable.³³



The other side of the coin

Yet it is also possible to discern value, beauty, glory in predation itself:

No one who has seen at close quarters the surge of a full-grown orca through the water, the prowl of a leopard through long grass, or that quicksilver stalling turn by which a peregrine returns to the stoop – all products of the refinement of predation over millions of years – can doubt the value that arises from the process.³⁴

You will all know Gerard Manley Hopkins’ poem *The Windhover* (the kestrel):

I caught this morning morning's minion, king-
 dom of daylight's dauphin, dapple-dawn-drawn Falcon, in his
 riding
 Of the rolling level underneath him steady air, and striding
 High there, [...]
 the hurl and gliding
 Rebuffed the big wind. My heart in hiding
 Stirred for a bird,—the achieve of; the mastery of the thing!

Reflecting on such sights, we may well conclude that: 'the sources of evil lie in attributes so valuable that we would not even consider eliminating them in order to eradicate evil.'³⁵

So predation has its aesthetic aspect. But not so parasitism – arguably the worst natural evil of all. Again, we can start with Darwin:

I cannot persuade myself that a beneficent and omnipotent God would have designedly created the Ichneumonidae with the express intention of their feeding within the living bodies of caterpillars [...]³⁶

Gray replied that evolution poses fewer problems in this respect than special creation, because it gives a *reason* for the suffering. He was reminding Darwin of his own argument, that suffering was part of the process which had led to advance and given rise to human beings. Right!

I am forced to conclude that good and evil are a 'package deal' – that we are contemplating not Original Sin but Inevitable Evil. And once more I suspect that the ancient Israelites and earliest Christians were closer to this awareness than post-Augustinian Christianity has become.



'Cruciform creation'

This is the haunting summary phrase of **Holmes Rolston III**, a Presbyterian minister and very fine philosopher of biology at the University of Colorado, who was Edinburgh's Gifford Lecturer in 1997–8. In a subsequent essay he writes:

Biological nature is always giving birth, regenerating, always in travail. Something is always dying and something is always living on. [...] This whole evolutionary upslope is a calling in which renewed life comes by blasting the old. Life is gathered up in the midst of its throes, a blessed tragedy lived in grace through a besetting storm. [...] There is a great divine “yes” hidden behind every “no” of crushing nature. God [is] the compassionate lure in, with, and under all purchasing of life at the cost of sacrifice. [...] the aura of the cross is cast backward over the whole global story, and it forever outlines the future. [...] The capacity to suffer through to joy is a supreme emergent and an essence of Christianity.³⁷



God's suffering

The final concept to which I want to refer is that *God suffers with God's creatures*. Once more there are echoes of pre-Augustinian Christianity. I think specifically of the third- and fourth-century Patripassian ‘heresy’, that God suffered with (or as?) Christ on the cross. (*Patri-passian* literally indicates the Father, suffering.) The idea of the Creator suffering with His (*sic*) creation is present in Teilhard, but now particularly associated with Process Theology, derived from the metaphysics of **A. N. Whitehead**, which regards God and matter as in perpetual, organic interaction. However, that is another huge field, and I must stop!



Conclusions

I end with three more quotes. The first, from **Austin Farrer**, is on Natural Evil as a whole, but it is presented in a lovely, biological image, beautifully appropriate to our theme:

Poor, limping world, why does not your kind Creator pull the thorn out of your paw? But what sort of a thorn is this? And if it were pulled out, how much of the paw would remain? How much, indeed, of the creation? What would a physical universe be like, from which all mutual interference of systems was

eliminated? It would be no physical universe at all. It would not be like an animal relieved of pain by the extraction of a thorn. It would be like an animal rendered incapable of pain by the removal of its nervous system; that is to say, of its animality. So the physical universe could be delivered from the mutual interference of its constituent systems, only by being deprived of its physicality.³⁸

The second is from **John Haught**, a fellow Catholic and academic colleague of Ilia Delio's:

[...] when we look at evolutionary data in light of the biblical image of God, the life process can make much more sense than when interpreted against the backdrop of materialist metaphysics. The undirected mutations, the process of natural selection, and the vastness of time required for the still unfolding story of life do not mandate the mechanistic conception [...] inherited from Newton and Descartes. Instead, the data of evolutionary science can be more intelligibly situated within a theological metaphysical framework centered around the biblical picture of 'the humility of God'. [...] The image of a vulnerable, defenseless, and humble deity may seem shocking to some, but it is crucial to the primordial Christian sense of the nature of ultimate reality.³⁹

And, in final summary, from **Joseph Fortier**, another Jesuit, who used to teach evolutionary biology at college level, but has now given himself to living with and ministering to Native Americans in the north-western USA:

The Darwinian view of evolution is a gift to Christian faith precisely in that it asserts the randomness, contingency, competition, suffering, and seeming purposelessness in the world. The credibility of notions of God's power that have to do with control is foiled by these realities. Instead, they challenge Christian thinkers to see the true effectiveness of God's power

in Jesus's suffering and death. [...] Thus [...] Darwinian evolution challenges Christian thought to question its ideas of perfection and power derived from Greek philosophy and instead return to its core faith in God's suffering love, as revealed by Jesus, as the power that moves the universe.⁴⁰

Nothing in biology makes sense, except in the light of evolution – and nothing in theology should attempt to do so either.

Notes

- ¹ Title of a book by the splendid Anglo-American philosopher of biology, Michael Ruse.
- ² Dobzhansky, an eminent Russian-American geneticist, was an Orthodox Christian.
- ³ Paleobiology is the study of the history of life.
- ⁴ Karen Armstrong, *The Bible: The Biography* (London: Atlantic Books, 2007), 28.
- ⁵ Karen Armstrong, *The Case for God* (London: The Bodley Head, 2009).
- ⁶ James Mellor Brown, *Reflections on Geology* [1838], quoted in John M. Lynch, ed., *Creationism and Scriptural Geology, 1817–1857* (Bristol: Thoemmes, 2002), 14.
- ⁷ Alec C. Cheyne, “Chalmers, Thomas (1780–1847)”, in *Encyclopedia of the Reformed Faith*, ed. Donald K. McKim and David F. Wright (Edinburgh: Saint Andrew Press, 1992), 61.
- ⁸ Quoted in Hugh Miller, *The Testimony of the Rocks: Or, Geology in Its Bearings on the Two Theologies, Natural and Revealed* (New York: Robert Carter & Brothers, 1875 [1857]), 141.
- ⁹ Thomas Chalmers, *The Evidence and Authority of the Christian Revelation* (Philadelphia: Finley, 1817), 125.
- ¹⁰ Miller, *Testimony*, vii.
- ¹¹ Quoted in John Pye Smith, *The Relation Between the Holy Scriptures and Some Parts of Geological Science*, 6th ed. (London: H. G. Bohn, 1854), 107.

- ¹² Charles Darwin, *On the Origin of Species By Means of Natural Selection*, 2nd ed. (London: John Murray, 1860), 490.
- ¹³ *Ibid.*, 1.
- ¹⁴ Letter to John Fordyce, 7 May 1879. Darwin Correspondence Project, “Letter no. 12041”, <http://www.darwinproject.ac.uk/DCP-LETT-12041>
- ¹⁵ L. Harrison Matthews, “Introduction” to 1971 edition of *The Origin*.
- ¹⁶ Letter from Charles Kingsley, 18 November 1859. Darwin Correspondence Project, “Letter no. 2534”, <http://www.darwinproject.ac.uk/DCP-LETT-2534>
- ¹⁷ Letter to Frederick Denison Maurice, 28 April 1863, in *Charles Kingsley, His Letters and Memories of His Life* (ed. Frances Kingsley; New York: Scribner, Armstrong, 1877), 337.
- ¹⁸ Aubrey Moore, “The Christian Doctrine of God”, in *Lux Mundi: A Series of Studies in the Religion of the Incarnation*, 12th ed. (ed. Charles Gore; London: John Murray, 1891), 82.
- ¹⁹ Aubrey Moore, *Science and Faith* (London: Kegan Paul, Trench & Co., 1889), 32.
- ²⁰ Crawford Knox, *Changing Christian Paradigms and Their Implications for Modern Thought* (Leiden; New York: Brill, 1993), 24.
- ²¹ Sarah Coakley, “Natural Theology and the Flat-plane Fallacy”, in *Darwinism and Natural Theology: Evolving Perspectives* (ed. Andrew Robinson; Newcastle upon Tyne: Cambridge Scholars Publishing, 2012), 99.
- ²² Stuart Kauffman, *At Home in the Universe: The Search for Laws of Self-Organization and Complexity* (New York; Oxford: Oxford University Press, 1995).
- ²³ Simon Conway Morris, *Life’s Solution: Inevitable Humans in a Lonely Universe* (Cambridge: Cambridge University Press, 2003).
- ²⁴ Simon Conway Morris, *The Runes of Evolution: How the Universe Became Self-aware* (West Conshohocken, Pa.: Templeton Press, 2015).
- ²⁵ Pierre Teilhard de Chardin, *The Phenomenon of Man* (trans. Bernard Wall; London: Collins, 1959), 297.

- ²⁶ Ibid., 92.
- ²⁷ Pierre Teilhard de Chardin, *Christianity and Evolution* (trans. René Hague; London: Collins, 1971), 240.
- ²⁸ Ilia Delio, *The Unbearable Wholeness of Being: God, Evolution, and the Power of Love* (Maryknoll, N.Y.: Orbis Books, 2013), xxiv; 115.
- ²⁹ Knox, *Changing Christian Paradigms*, 117.
- ³⁰ *In Memoriam A. H. H.* (1849).
- ³¹ Letter to J. D. Hooker, 13 July 1856. Darwin Correspondence Project, “Letter no. 1924”, <http://www.darwinproject.ac.uk/DCP-LETT-1924>
- ³² Darwin, *The Origin* (1859), 490.
- ³³ Michael Pollan, *The Omnivore’s Dilemma: The Search for a Perfect Meal in a Fast-food World* (London: Bloomsbury, 2006), 322f.
- ³⁴ Christopher Southgate, *The Groaning of Creation: God, Evolution and the Problem of Evil* (Louisville, Ky.; London: Westminster John Knox Press, 2008), 9.
- ³⁵ Patricia Williams, *Doing Without Adam and Eve: Sociobiology and Original Sin* (Minneapolis, Minn.: Augsburg Fortress, 2001), 179.
- ³⁶ Letter to Asa Gray, 22 May 1860. Darwin Correspondence Project, “Letter no. 2814”, <http://www.darwinproject.ac.uk/DCP-LETT-2814>
- ³⁷ Holmes Rolston III, “Kenosis and Nature”, in *The Work of Love: Creation as Kenosis* (ed. John Polkinghorne; Grand Rapids, Mich.; Cambridge; William B. Eerdmans, 2001), 58ff.
- ³⁸ Austin Farrer, *Love Almighty and Ills Unlimited: An Essay on Providence and Evil* (London: Collins, 1962), 51.
- ³⁹ John F. Haught, *God After Darwin: A Theology of Evolution* (Boulder, Colo.; Oxford: Westview Press, 2000), 45ff.
- ⁴⁰ Joseph Fortier, *Confluence of Evolutionary Science and Christian Faith* (s.l.: Xlibris Corp., 2012).