Darwin Disproved?

Evolution, Debates and Proxy Wars, 1860-2020

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by

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Contents

Acknowledgements

PROLOGUE 3

1 CONTEXT 10

2 EVOLUTION OF A MYTH 29

3 THE CHALLENGE OF INTELLIGENT DESIGN 83

4 COSMOS AND CHAOS 132

5 THE MYSTERY OF MYSTERIES: LIFE ON EARTH 157

6 PARADIGM REGAINED 190

EPILOGUE 229

WORKS CITED 232

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PROLOGUE

What if Darwin got it wrong? What if all the crises, alienations and losses of faith we associate with the aftermath of the publication of the *Origin of Species*[1] had been triggered by a false prospectus? What if the latent but ever-present hostilities between science and religion of the last almost two centuries had been in part at least fomented by the equivalent of a 'dodgy dossier'? Like many others who 'learned about' Darwin in school, I appear to have internalised his ascent-of-man narrative without demur, by what in retrospect seems like little more than a passive process of osmosis. By the second half of the twentieth century, Darwinism had become accepted as so much part-and-parcel of the mental furniture and indeed fashionable thinking of the day that it would have seemed politically incorrect (and even un-hip) to challenge the truth-status of the *Origin of Species*. I must certainly have thought so since I recollect showing off my (superficial) knowledge of Darwinism to my first girlfriend without being aware that what I was saying was in any sense contestable. To be sure, it had sometimes struck me that the *Origin of Species* contained some strange and counter-intuitive ideas, but I told myself that modern science often *is* counter-intuitive[2] (remembering the vast indeterminacies thrown up by recent advances in quantum theory), and I gave the

matter little further thought. Since Darwin had been fêted by the scientific community for more than a century and a half, I deferred to what I imagined must be the properly peer-reviewed orthodoxy. Surely, I reasoned, any opposition to Darwin must be confined to the peripheral ranks of Biblical fundamentalists and what are now termed New Earth creationists – mustn't it?

This complaisant (and complacent) stance was rather shaken when more recently I encountered some less easily disregarded opposition emerging from the ranks of some of Darwin's latter-day peers in the ranks of scientific *academe*. Collectively, these publications pointed to the astounding conclusion that natural selection was little more than a creation myth to satisfy the modern age. These voices of opposition – and the number of whistle-blowers has been legion – together with the inescapable conclusion to which they tended, were so unsettling that I found it impossible to ignore the dispute as being a 'merely academic' issue; for if there is one subject which has had huge, often convulsive implications for the generality of humankind, it is that of natural selection. Any dispute concerning Darwin must necessarily have far-reaching implications beyond the guild of the biological sciences. It is not given to many to be able to muster the kind of equanimity shown by nineteenth-century geologist Sir Charles Lyell's brother-in-law who opined that, mortifying as the notion of human descent from jellyfish might be, "it will not make

much difference practically"; or to be able to equal Dr Johnson's priceless reaction to the notion held by an eccentric nobleman (Lord Monboddo) that man could be descended from apes: "Conjecture as to things useful, is good, but conjecture as to what would be useless to know, such as whether men went on all fours, is very idle."[3]

The majority of our Victorian forbears certainly could not find it within themselves to be so philosophical about a godless theory of human evolution bidding fair to project them into "a suddenly mechanistic world without a mechanic", to borrow a phrase used by Noel Annan in his biography of Sir Leslie Stephen (said to have lost his faith after reading Darwin). This sense of being cast adrift from the erstwhile reassurances of the Christian faith was at painful variance with the paradigm of a providentially directed cosmos which had prevailed throughout the Christian centuries up to 1859. In addition, when Darwin discharged his famous Parthian shot twelve years after publication of the *Origin of Species* in the *Descent of Man* (1871)[4] with its notorious claim of humankind's consanguinity with simian forbears, this amounted to a rather unambiguous demotion of humankind to a considerably lesser place in the scheme of things than its wonted pedestal just 'a little lower than the angels'. This demotion was of course to be exacerbated for twentieth century men and women by

Freud's seemingly consequential conclusions about the 'hominid' nature of our subconscious minds.

If a group of tenured academics and other responsible scientists could no longer support the claims on which these devastating inferences depended, and on which the world-view of the majority in the West presently rests, then it struck me that this must surely count as a matter of some existential moment. Such disquieting possibilities drove me to investigate for myself the dispute between pro and contra-Darwin factions. I make no apology for having made the attempt to read my way into a subject for which I have no formal qualifications since my researches have led me to the conviction that the subject is of too universal an import to be left entirely in the hands of subject specialists, some of whom exhibit an alarming degree of bias and intransigent *parti pris* unconducive to the dispassionate sifting of scientific evidence. Few coming to this subject can of course claim to occupy that fabled Archimedean vantage point of 'seeing things clearly, and seeing them whole' and I make no such hyperbolic claim for myself. However, given the dismayingly sectarian nature of many evolution debates (whence my sub-title to this volume) it is a tedious but unavoidable necessity that I should add here at the outset that I am a non-theist and can at least give the assurance that the critique which follows will be based solely on rationalist criteria and principles.

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The book is structured as follows. In the first chapter, Context, I introduce the broad subject of how Charles Darwin and Alfred Russel Wallace came to formulate their theory of evolution by natural selection.

The second chapter ('The Evolution of a Myth') looks at Darwin's intellectual formation from boyhood to maturity and the immediate reception of his *Origin of Species* with non-specialist British readers.

My third chapter ('The Challenge of Intelligent Design') turns to the mostly critical nineteenth-century reviews and receptions of the *Origin of Species* appearing in the years and decades after its publication, before Darwin had become the respected sage of his later years. The refreshing honesty of the early responses gives added clarity to the voices of dissent from Darwinism which were always present but which became more insistent in the final decades of the twentieth century. Those modern responses are covered in the same chapter, together with the fraught issue of the fossil evidence to back up Darwin's claims (which is exiguous and has occasionally even been proved to be fraudulent). After this I turn to a discussion of what is in effect Darwin's second volume of his *Origin* but called *The Descent of Man* where (wo)man, rather than our

hominid ancestors, becomes the direct focus of the author's attention.

The fourth chapter ('Cosmos and Chaos') turns to a consideration of cosmological discoveries in the last half century with a bearing on the question of how the earth gained the unique supportive biosphere which enabled the evolution of plants, animals and humans in the first place. Thereafter I focus on the 'proxy wars' of my subtitle in the attempt to unpack and in some cases unmask the frequently unacknowledged religious or anti-religious attitudes which have scarred the search for solidly-based empirical findings for more than a century and a half.

In my fifth chapter ('The Mystery of Mysteries') I turn to the subject of what we can reasonably expect of the scientific method and what not to expect in the perennial quest to reveal the mysteries of life. In particular I question whether unrealistic expectations have led to questionable conclusions and issue an open invitation to subject specialists to reappraise the whole subject of natural selection as an evolutionary pathway.

Finally, in the sixth chapter ('Paradigm Regained') I draw together threads and findings from previous chapters to form a concluding synthesis. I round off the volume with some reflections on the ways in which researching and writing about this subject have led me to some conclusions which I would have found surprising before I embarked on the project, especially

regarding the intersection of science and religion. This results in some suggestions which might, in time to come, point the way towards a possible paradigm shift in the area of evolutionary study. A short epilogue is also appended together with an extensive list of works cited which will provide pointers to further reading.

NOTES

1. *On the Origin of Species*, edited by Gillian Beer (Oxford: OUP, 2008).
2. On the sometimes counter-intuitive weirdness of science see Lewis Wolpert, *Six Impossible Things before Breakfast. The Evolutionary Origins of Belief* (London: Faber and Faber, 2006) and *The Unnatural Nature of Science* (London: Faber and Faber, 1993).
3. A.N. Wilson, *Charles Darwin. Victorian Mythmaker* (London: John Murray, 2017), p.56.
4. *The Descent of Man and Selection in Relation to Sex*, edited by James Moore and Adrian Desmond (London: Penguin, 2004).

ONE

CONTEXT

In 1959, against the backdrop of a formal eulogy accompanying the centenary celebrations of the first edition of Charles Darwin's *The Origin of Species*, Julian Huxley (grandson of Darwin's great ally, Thomas Huxley) bestowed the status of *fact* on Darwin's theory of natural selection. Today many experts are inclined to think that Darwin's theory, despite influential supporters, cannot in strictly logical terms rise above the status of a hypothesis or philosophical postulate. Any theory about biological development claimed to have occurred millions of years in the past clearly cannot be tested by those conventional scientific procedures used to confirm or else disprove theories about contemporary phenomena. We cannot climb aboard the next available Tardis as time travellers to see for ourselves the truth or otherwise of Darwin's conviction that you and I had, millions of years ago, ultimately evolved from 'prokaryotes' (bacterial forms). Because of the sheer untestability of Darwin's hypothesis, by 1897 the Oxford philosophy professor, F.C.S. Schiller, had gone on

record to state that Darwin's idea was "a methodological assumption, and, as such, not a fact".[1]

The foundations of Darwin's theory of natural selection may be said rest on expert observation (from his extensive fieldwork in South America aboard HMS *Beagle*) linked to intelligent speculation. His fundamental idea essentially concerns the inheritance of changed characteristics that provide superior adaptations to any given animal's environment. What happened according to Darwin's supposition is – taking the giraffe as an example – that some individual giraffes were *completely by chance* born with longer necks and so gained the selective advantage of being able to reach higher branches for food. This guaranteed their survival and opportunities to mate and hence their chances of leaving offspring who would inherit longer necks. Repeated over the generations, this would account for the superior length of their necks. Over time, the species that were best equipped by happy chance to survive would thrive and reproduce, while others would run the risk of becoming extinct.

This has remained the bedrock of the Darwinian understanding of evolution. However, Darwin himself did not live to see the breakthrough of Mendelian genetics, first discovered in experiments with garden peas conducted by the Moravian monk, Gregor Mendel, in the 1860s but whose significance became more widely appreciated only in the early part of the twentieth

century. This would eventually lead to what is now termed neo-Darwinism in the 1940s, where the findings of genetics would be synthesised with the Darwinian model, leading to an expression of Darwin's ideas with more state-of-the-art terminology. Using gene terminology, one would say that natural selection was the process whereby persons carrying better genes in terms of survival and reproduction would tend to have a larger number of offspring and that those offspring in turn would have better genes. Over generations the process will become a virtuous genetic circle: beneficial mutations will prevail, harmful ones be eliminated, resulting in evolution toward better adaptation.

So the two parts of Darwinian evolution consist of first, random mutation, followed by natural selection. There is no direction in evolution: mutations of all sorts occur, some destructive to the organism, some benign. Natural selection then selects from these mutations, eliminating some and choosing others. Many mutations are eliminated because they cannot survive in their natural environment, whereas others survive because they are better adapted to that environment. Mice that grow more fur in cold climates survive and therefore reproduce more abundantly than hairless mice which in some cases do not live long enough in the cold climate to reproduce at all. The climatic environment selects for furry mice not because they are stronger or better but

simply because they are fitter-for-purpose and happen, by chance, to be better adapted to the cold.

Darwin stressed that the whole process responsible for the genetic variation was blind and so heedless of the needs of the organism (he later conceded that 'natural preservation' might have been a better term than 'natural selection' with its misleading connotation of *purpose*). It was in fact entirely down to luck whether any change might occur which could confer a slight adaptive advantage. He was unable to suggest reasons for those changes in the first place, believing they could be linked to random disturbances in the reproductive system, but later scientific advances have identified the changes with genetic mutation and recombination. Several critics have in fact pointed out that, as long as the origin of variation went unexplained, natural selection could not be accounted a complete mechanism of evolution. Many have pointed out that the initial variation was the truly creative force, selection merely eliminating those of its products which were sub-standard.

As Darwin pondered the subject further, he conceived the idea that Nature acts in a way comparable in some sense to that of the market in capitalist economies, as was suggested to him by his reading of the *Essay on Human Population* (1798) by the economist and demographer, Thomas Malthus. [2] Malthus's view of mankind was similar to and in part influenced by that

pessimistic political philosopher who had lived a century before him, Thomas Hobbes. Hobbes saw men and women as selfish creatures, motivated only by personal advantage. He states: "During the time men live without a common power to keep them all in awe, they are in that condition which is called war; and such a war as is every man against every man" – the latter being the famous dictum of the *bellum omnium contra omnes*. If left in the state of nature, people's lives would be, wrote Hobbes in another phrase since become proverbial, but "solitary, poore, nasty, brutish, and short". One of Malthus's major themes concerned competition between humans for resources to survive, because he too felt that, left in a Hobbesian state of nature, each man's hand would be raised against the other, and the devil take the hindmost. He warned of the dangers of overpopulation, leading to the sobriquet of 'Population Malthus' being widely applied to him – he was in fact the historical prototype for Charles Dickens's Scrooge figure with his dirgeful refrain of 'overpopulation, overpopulation'.

Reading Malthus by chance for purely recreational reasons, it suddenly dawned on Darwin how he might usefully appropriate the Malthusian analogy, essentially redirecting Malthus's ideas about *laissez-faire* capitalist societies to the struggle for existence in the wider biological world. Using that analogy, he concluded that:

favourable variations would tend to be preserved, and unfavourable ones to be destroyed. The results of this would be the formation of a new species. Here, then, I had at last got a theory by which to work [...] *I saw, on reading Malthus on population, that natural selection was the inevitable result of the rapid increase of all organic beings* [...Malthus] *gave me the long-sought clue to the effective agent in the evolution of organic species.*[3]

I wish to return to the not immediately obvious implication of the words, "The results of this would be the formation of a new species" presently, but first it should be noted that Malthus's considerable influence on the development of evolutionary thought can also be found in the similar epiphany experienced by Alfred Russel Wallace, who came upon his ideas a decade or so after Darwin. Wallace in his Autobiography also expresses his debt to Malthus for prompting him to a recognition of what he terms the 'self-acting process' of evolution, and he expressed this discovery in terms which I believe make the issue particularly clear and which I cite here:

Why do some die and some live? And the answer was clearly, that on the whole the best fitted live. From the effects of disease the most healthy escaped; from enemies the strongest, the swiftest or the most cunning;

from famine, the best hunters or those with the best digestion, and so on. Then it flashed upon me that this self-acting process would necessarily improve the race, because in every generation the inferior would inevitably be killed off and the superior would remain – that is, the fittest would survive [...] *I had at last found the long-sought-for law of nature that solved the problem of the origin of species.* [4]

It could be charged that both Darwin and Wallace had come upon their theory by dint of some rather unsystematic ad hoccery; so much so in fact that it has been seriously questioned whether they 'invented' natural selection rather than discovered it. Exemplifying to a tee the thesis that science never completely transcends the socio-political context in which it is produced, and that knowledge can be created as well as discovered, neither man drew conclusions exclusively from observed biological data in the way traditionally endorsed by scientific best practice. Instead, the analogy both chose lay outside their primary area of expertise – and common experience tells us that some analogies can be closer than others. Karl Marx for instance saw in Darwin's theory the capitalist system in a nutshell, and stated that the English working class's hatred of Malthus was entirely justified. Friedrich Engels was even harsher on Malthus for his being the author of "the crudest, most barbaric theory which ever existed, a system of despair

which struck down all those beautiful phrases about love of neighbour and world citizenship."[5] In a sense, both Darwin and Wallace were imposing a distinctly mid-Victorian capitalist notion of economics on to the older, primordial world which was the proper object of their study. Appealing to this somewhat approximate analogy, they transferred it from its original context and mapped it on to the rather different world of zoology, a point to which further attention will be paid below.

Returning now to the point I pended, namely, the speculation that the selection/ preservation process could lead to the creation of new species: on a first reading this might seem to be a *non-sequitur*. However, spelling out what Darwin meant here, his presupposition was that successful members of any given species would develop to such an extent that they would become (over countless aeons) superior forms un-recognisable as having sprung from the older, inferior biological stock. He introduces this thought in a somewhat unheralded way but this in part was because he was using an elliptical shorthand meant primarily as an *aide-mémoire* to himself rather than the formal code of a public statement, where the missing logical link would have to be supplied. The apparent *non-sequitur*, however, makes perfect sense within the context of the century of evolutionary theory which had preceded Darwin. Here a number of naturalists had mooted the possibility of one species modulating biologically into another one over vast

swathes of time. This idea had become so common that it had long since been lexicalised in French in the term *transformisme* (associated primarily with the French naturalist, Lamarck) and, in English, 'transmutation' (most closely associated with Darwin's own grandfather, Erasmus Darwin). It was clearly this tradition to which Darwin was alluding, a tradition which he may have thought did not need to be spelled out in greater detail.

Darwin's *modus operandi* as a naturalist was, first, simple observation. There are certain undeniable similarities in function between a human hand, a mole's paw and the leg of a horse, a porpoise's paddle and the wing of a bat. They are constructed physiologically on the same pattern and with a comparable bone structure. These likenesses have suggested to some observers that they point to a distant relationship and an inheritance from a common ancestor. In other words, if you take away the idea that all the species were created fully formed by some divine power, then the idea of common origin makes theoretical sense of these commonalities. Cumulatively, over 'Jurassic' swathes of time and by an aggregation of small incremental differences, this process will have resulted in certain cases in a thoroughgoing transmutation of species, starting from microscopic beginnings in the form of unicellular common ancestors, like bacteria, via numberless further stages up to ape-like intermediaries, thence towards the evolution of *homo sapiens*.

Darwin was aware that he had authored what he himself described as "a provisional hypothesis or speculation", but he believed that it was the best theory so far devised that could explain the origin of the species "until a better one be advanced". Many others, however, disagreed with Darwin's speculation, however self-effacingly he expressed it, and it was vigorously disputed by many eminent scientists in the decades following the publication of the *Origin*. Asa Gray, the American natural science professor with whom Darwin frequently corresponded, protested that evolution without divine design brought with it "accumulated problems beyond belief". Sir Charles Lyell, whose three volumes entitled *Principles of Geology* (1830-3) inspired Darwin when he read the first of those volumes on his famous voyage on HMS *Beagle*, had not reconciled himself to Darwin's theory even thirteen years after its publication. In 1872 he wrote that the basic problem of creation/evolution remained as inscrutable as ever despite what he diplomatically termed Darwin's impressive evidence. Essentially, he remained unmoved from his prior (theistic) opinion that the mystery of the origin of variations in the biological world involved "causes of so high and transcendent a nature that we may well despair of ever gaining more than a dim insight into them".[6] Lyell made the attempt to square Darwinian notions with his own beliefs, but only, it must be noted,

at the cost of misrepresenting Darwin quite signally, writing:

The more the idea of a slow and insensible change from lower to higher organisms, brought about in the course of millions of generations according to a preconceived plan, has become familiar to men's minds, the more conscious they have become that the amount of power, wisdom, design and forethought required for such a gradual evolution of life, is as great as that which is implied by a multitude of separate, special and miraculous acts of creation.[7]

It is possible, if so minded (and Lyell and a number of other Victorians *were* so minded), to gloss human evolution in progressionist terms as the ascent of man from inauspicious beginnings to ultimate human pre-eminence. This Christian interpretation could then be used to facilitate an accommodation with the larger Darwinian narrative, which, for all that it differed from the orthodox Genesis narrative, could still be glossed as an alternative providential route – with the difference that this one posited the rather different means of biological gradualism.[8] Such for instance was the interpretation (some might argue rationalisation) adopted by the clergyman author of *The Water Babies*, Charles Kingsley, as the reason for his support of Darwin. In a letter to Darwin, Kingsley wrote that it was "just as

noble a conception of Deity to believe that He created primal forms capable of self-development" as it was "to believe that He required a fresh act of intervention to supply the lacunas which He himself had made".[9] In place of the conception of a static creation – which for Kingsley conjured up disturbing notions of the indifferent *deus absconditus* [absent God] of the Deists – Kingsley rejoiced in a more dynamic, 'hands-on' process benefiting from the *continuous* supervision of the Creator which he took to be implicit in Darwin's narrative.

Darwin, needless to say, was not prepared to countenance such accommodations and bridled at Lyell's would-be Christian hijacking of his ideas, replying in direct terms: "I would give nothing for the theory of Natural Selection if it requires miraculous additions at any one stage of descent". As Darwin saw the matter, the views of Gray, Lyell and Kingsley, by espousing the higher law of providential arrangement, would have had the effect of putting biological science back into the realm of special creation, this being the very metaphysical quagmire from which Darwin was anxious to extricate it.

Darwin had especially hoped to convert Lyell to his viewpoint since Lyell's theory of 'uniformitarianism' in geology appeared on the face of it to cohere with Darwin's gradualistic ideas about human evolution. Along with Malthus, Lyell had been a major inspiration

for the evolution of Darwin's thinking and also for Darwin's self-definition as a professional scientist, for Lyell represented the growing scientific trend towards wholly naturalistic, non-theistic explanations of terrestrial phenomena. Lyell's geological positioning was conspicuously opposed to pre-1830 ideas of 'Mosaic' geology and what was termed the doctrine of catastrophism. According to that hypothesis, the world arose through a sequence of catastrophes causing multiple extinctions, Noah's Flood being the last of these. Each catastrophe was redeemed by God through his creation of new species of ever greater complexity. The idea was that it had pleased God to improve on his Creation after the extinctions following on from each catastrophic event.

Lyell's opposing theory, uniformitarianism, was first proposed by the Scottish geologist and polymath James Hutton in his *Theory of the Earth* (1788), and later endorsed and developed by Lyell in his three magisterial volumes. Hutton did not think that catastrophes were necessary to account for terrestrial changes. Rather, they had been caused by the same forces as those active in his own day: frost, wind, running water and the internal heat of the earth. Since such gradual, attritional forces would have required hundreds and millions of years to achieve their effect (far more than the 'Biblical' age of the earth computed by seventeenth-century Bishop Ussher of Armagh of approximately six thousand years),

uniformitarianism clearly stood in opposition to Biblical notions of the age of the planet as well as to the Noachian Deluge.

One can see why Darwin thought he might gain Lyell's endorsement for his purely naturalistic theory of mankind's development, but Lyell clearly made a distinction in his own mind between the geological record and the world of organic and human life. Darwin, unlike the fêted Hutton, was thus obliged to forego the powerful endorsement of the renowned Lyell. He fared little better with other influential opinion-formers. His opponents included the Duke of Argyll, a Scottish nobleman with a serious and respected interest in naturalist ideas, St. John Mivart, a leading London science professor, and England's leading palaeontologist of the period, Richard Owen, all of whom vehemently contested the idea that natural selection could produce new species. Louis Agassiz too, the brilliant Swiss naturalist who had gained a chair at Harvard, contended that the beginnings of any given species were unobservable and beyond the capability of any science to explain: to speculate without observable facts was neither responsible nor even logically feasible.

It has become the watchword of modern science that large claims must be accompanied by large proofs, and surely no larger claim was ever made than the one Darwin made for his descent-with-modification (a.k.a. transmutation of species) theory of natural selection.

Even now, more than a century and a half after the publication of his *Origin*, it has the power to shock and bewilder, especially when transposed from technical terms into the currency of everyday vernacular – a recent science writer, for instance, described natural selection in somewhat droll terms as "a mechanism powerful enough to turn fish into giraffes, given 400 million years".[10] My sense is that a good number of persons today might be willing to entertain the possibility that *homo sapiens* had descended from ape ancestors because of the conspicuous morphological likeness – provided, of course, they were willing to suspend disbelief over the rather large matter of the different cognitive capacities of man and ape. Unlike our nineteenth-century ancestors, we are no longer constrained by the Biblical testimony that Adam had been specifically 'ensouled' by God. This has become a logic most of us have lost with the progressive demythologisation[11] of Scripture in the later nineteenth and twentieth centuries. We are accordingly the more prepared to accept an entirely natural explanation for the claimed ape-to-man evolution since we no longer have to agonise about where and when along the supposed evolutionary pathway any 'ensoulment' might be imagined to have taken place.

However, that the remote ancestors of the apes themselves ultimately derived from minute bacterial forms would, I think, still cause many people to pause. For put in those terms, Darwinism sounds as weirdly

incredible as anything found in Ovid's *Metamorphoses,* the shape-shifting myths of pre-Christian Celtic tradition, or even Erich von Däniken's belief that transmutation of species had been caused by invading aliens manipulating the genetic codes of animal and human life. However that case may be, a development of the simplest 'prokaryotic' life in the direction both of *homo sapiens* and gigantic animals such as elephants and the extinct dinosaurs is precisely what Darwinism proposed and is still proposed by its present-day supporters, as one of Darwin's most gifted expositors, Richard Dawkins, recently spelled out:

Natural selection happens naturally, all by itself, as the automatic consequence of which individuals survive long enough to reproduce, and which don't [...]. *Given enough generations, ancestors that look like newts can change into descendants that look like frogs. Given even more generations, ancestors that look like fish can change into descendants that look like monkeys. Given yet more generations, ancestors that look like bacteria can change into descendants that look like humans.*[12]

The latter contention will not be left unexamined, and the whole issue of the tenability of the natural selection theory will be revisited below. For now, having made the attempt to set the scene for Darwin's intellectual journey, and before returning to his

evolutionary ideas in more detail, I wish in the next chapter to turn first to a brief biographical consideration of Darwin's earlier formation to try to assess how a less than stellar schoolboy and student came upon that theory which others had sought unsuccessfully for more than a century before his birth. Thereafter attention will turn to a topic tactically skirted in the *Origin of Species* but which nevertheless provides the essential foundation and indeed precondition for that work, namely, the issue of the absolute origin of life on earth. For although Darwin felt that the subject of life's origination was "*ultra vires* [beyond our powers] in the present state of knowledge", he still permitted himself to speculate in a letter that it could have begun by spontaneous generation (i.e. not by divine Creation) from an accidental reaction of chemical elements within a "warm, small pond".

This postulate, first advanced by the ancient Greek Atomist philosophers (about whom more below) went on to underpin twentieth-century notions of 'chemical self-assembly' in a watery medium (the process now termed 'abiogenesis'). At this pre-organic stage, as yet unknown chemical reactions are claimed to have produced rudimentary life forms, raising the curtain for sentient life to take to the stage by dint of the developmental processes of natural selection. Those primitive life forms will, on that theory, have become the putative raw material for natural selection to go to work on. The question of why Darwin may have elected to

omit any formal consideration of this topic in the *Origin* will then be explored further.

NOTES

1. Cited by Neal C. Gillespie, *Charles Darwin and the Problem of Creation* (Chicago, Chicago UP, 1979), p.112.
2. *An Essay on the Principle of Population*, edited by Anthony Flew (London: Penguin, 1970).
3. *An Essay on the Principle of Population,* ed. Flew, Introduction, pp.49-50.
4. Cited by Anthony Flew in *An Essay on the Principle of Population*, Introduction, p. 51.
5. Anthony Flew, *Darwinian Evolution*, second edition (New Brunswick and London: Transaction, 1997), pp.76-7.
6. Cited by Neal C. Gillespie, *Charles Darwin and the Problem of Creation*, p.110.
7. Gillespie, *Charles Darwin and the Problem of Creation*, p.111.
8. This subject is dealt with very fully by James R. Moore in *The Post-Darwinian Controversies. A Study of the Protestant Struggle to come to terms with Darwin in Great Britain and America 1870-1900* (Cambridge: CUP, 1981).
9. Cited by Alister McGrath, *Inventing the Universe. Why we can't stop talking about Science, Faith and God* (London: Hodder, 2015), pp.102-3.
10. David Waltham, *Lucky Planet. Why Earth is exceptional – and what that means for Life in the Universe* (London: Icon, 2014), p.123.

11. See on this trend Rudolf Bultmann, *Jesus Christ and Mythology* (London: SCM, 2012).

12. *The Magic of Reality* (London: Transworld, 2012), p.30.

TWO

THE EVOLUTION OF A MYTH

Truly, scientific orthodoxies, like other orthodoxies, are sometimes very strange; and it is odd that scientists are so susceptible to self-hypnotic indoctrination.[1]

"The most dangerous man in England." In such terms was Darwin described by a passer-by to his companion who spotted him by chance in London in 1863. Yet the man who disturbed the settled belief-patterns of Victorian Britain and who gave rise to controversies which have endured to the present day was the very last person who would have harboured any desire to give any offence to anyone (he appears, for instance, to have delayed publication of the *Origin* partly out of deference to the religious sensibilities of his wife, Emma). Darwin's life and personal formation reveal – perhaps counter-intuitively at first blush – a decent, often retiring man, beset in his middle years by trying internal maladies, who had little of the firebrand or iconoclast about him.

The young Charles had the great good fortune to have been born into an accomplished and well-to-do family, one of his grandfathers being the polymath

Erasmus Darwin, who was both a medical practitioner and a very original combination of poet and evolutionary philosopher; the other Josiah Wedgwood, the highly successful founder of the Wedgwood pottery enterprise. The Wedgwood manufacturing wealth, amplified by Darwin's father Robert's twin career as both a medical doctor and financier, gave the family financial security, and grandfather Erasmus's scientific interests gave the young Charles an important intellectual hinterland which was to play a role in his adult career as a gentleman-naturalist (being independently well-off, Darwin never had a paid job).

Despite the many advantages heaped upon the young Charles by his privileged background, however, his early life and career were marked by indecision and lack of clear motivation. Furthermore, in purely scholastic terms, he evidenced little of the brilliance one might expect of one who was to become such an intellectual pioneer in the world of biological science. Darwin himself, unassuming and admirably 'grounded' in his own self-assessments, would have been more than happy to concur with that verdict since his Autobiography abounds in self-effacing anecdotes such as his being "slower in learning" than his sister, Catherine, or his difficulty in learning foreign languages and mastering the art of Classical verse-composition when in school. In sum, he wrote:

When I left the school I was for my age neither high nor low in it; and I believe that I was considered by all my masters and by my father as a very ordinary boy, rather below the common standard in intellect.[2]

From 1818 to 1825 Charles attended Shrewsbury Schoòl whose institutional rigidities he frequently sought to escape by looking for natural history specimens (his true interest) around and about the school's grounds. In 1825 his physician father dispatched him to the prestigious Edinburgh Medical School. Here he was able to pursue his natural history interests but, despite developing a wide range of scientific ideas in Edinburgh, Charles did not complete his medical course, leaving prematurely in 1827. He cited personal squeamishness about having to witness harrowing operations (this was an era before anaesthetics), but it is difficult not to imagine that some maverick element of his personal formation did not play some part in his decision. In addition, as his biographers Desmond and Moore point out, his comfortable circumstances simply did not give him adequate motivation to concentrate his mind on success in a rather exacting professional discipline.[3] Darwin in fact admits as much in his Autobiography:

I became convinced from various small circumstances that my father would leave me property enough to subsist on with some comfort, though I never imagined

that I would be so rich a man as I am; but my belief was sufficient to check any strenuous effort to learn medicine.[4]

Subsequently, his father, anxious that his son should not become "an idle sporting man" (a propensity which Charles was inclined to indulge in the company of sundry 'hearties' in the numerous homosocial groups encouraged by a then almost wholly male higher education sector), directed him towards Cambridge University. Here, in an age when no profound spiritual convictions were required for such a career, his son was set to study theology so as to attain that popular nineteenth-century fall-back position of the English middle classes of finding a living as a parson. Yet this, too, Charles eventually declined, despite the congenial opportunities Cambridge afforded him to discuss matters of common scientific interest with William Whewell, Adam Sedgwick and other notable science scholars of that time.

Not surprisingly at this point, there was some family anxiety that Charles might fall into that type of gentleman-idler which his material security would have permitted; but then his father (forced once more into the breach in an era when nepotism was not seen as problematical either by university authorities or in other walks of life) procured for him the post of gentleman-assistant to the ship's captain on HMS *Beagle*. It was in

fact Charles's minor public school background that commended him to the Beagle's captain, Robert Fitzroy, the appointment being somewhat analogous to an unpaid internship. That famous ship and its five-year voyage of exploration and observation took Darwin to South America and the South Sea Islands where he was able to catalogue and study the flora and fauna of the region. It proved to be the making of the young naturalist, giving him more than ample opportunities for that protracted field work which formed the basis of his later writings. In short, this richly formative experience gave firm and sustained direction to the rest of his life, for it was in that remote and exotic milieu that Darwin, previous vacillations banished, was at last able to find himself.

A common trope of fictional books and films representing life in the earlier Victorian era is the eccentric-looking clergyman with a net on a long wooden handle used to collect butterflies and other wildlife from his countryside forays. The image so beloved of film-makers is not just a picturesque fictional prop: it reveals what in many cases was an important reality of scientific endeavour in the first half of the nineteenth century where naturalists, frequently men of the cloth, sought to analyse findings culled from Nature in order to illustrate and illuminate what they firmly believed was the divine order of things. The assertion of Francis Bacon that God had authored two books, the Bible being the first and the second inscribed in the very

fabric of nature itself, had a long pedigree and lasted well into the high Victorian era, so much so that many scientists believed that it was the theological relevance of their searches which was the ultimate justification of their pursuit. Science supported religion and vice versa.

The doctrine that the design of Nature permitted inferences about the nature of God himself was most influentially articulated in a book Darwin knew well and admired, William Paley's *Natural Theology* (1802, frequently reprinted throughout the nineteenth century).[5] Hence the harmonious adjustment of animals to their environment was glossed as an indication of God's providential arrangements: the wings of birds, for instance, clearly so vital to avian life, were interpreted as evidence of God's benign superintendence. Perhaps Paley's most famous illustration of divine intervention was his oft-cited watch analogy which I will reproduce *in extenso* here both because it is the classical exposition of the belief but also because it provides the underpinning of much of the intellectual structure of what is termed the modern Intelligent Design movement (about which more below):

In crossing a heath, suppose I pitched my foot against a stone, and were asked how the stone came to be there, I might possibly answer, that, for anything I knew to the contrary, it had lain there for ever; nor would it, perhaps, be very easy to shew the absurdity of this

answer. But suppose I found a watch *upon the ground, and it should be inquired how the watch happened to be in that place, I should hardly think of the answer which I had before given – that, for anything I knew, the watch might have always been there. Yet why should not this answer serve for the watch as well as for the stone? Why is it not as admissible in the second case as in the first? For this reason, and for no other; viz., that, when we come to inspect the watch, we perceive (what we could not discover in the stone) that its several parts are framed and put together for a purpose, e.g. that they are so formed and adjusted as to produce motion, and that motion so regulated as to point out the hour of the day; that, if the different parts had been differently shaped from size from what they what they are, if a different size from what they are, or placed after any other manner, or in any other order than that in which they are placed, either no motion at all would have been carried on in the machine, or none which would have answered the use that is now served by it. To reckon up a few of the plainest of these parts, and of their offices, all tending to one result: We see a cylindrical box containing a coiled elastic spring, which, by its endeavour to relax itself, turns round the box. We next observe a flexible chain (artificially wrought for the sake of flexure) communicating the action of the spring from the box to the fuse. We then find a series of wheels, the teeth of which catch in, and apply to, each other, conducting the*

motion from the fuse to the balance, and from the balance to the pointer, and, at the same time, by the size and shape of those wheels, so regulating that motion as to terminate in causing an index, by an equable and measured progression, to pass over a given space in a given time. We take notice that the wheels are made of brass, in order to keep them from rust; the springs of steel, no other metal being so elastic; that over the face of the watch there is placed a glass, a material employed in no other part of the work, but in the room of which, if there had been any other than a transparent substance, the hour could not be seen without opening the case. This mechanism being observed, (it requires indeed an examination of the instrument, and perhaps some previous knowledge of the subject, to perceive and understand it; but being once, as we have said, observed and understood,) the inference, we think, is inevitable, that the watch must have had a maker, that there must have existed, at some time, and at some place or other, an artificer or artificers who formed it for the purpose which we find it actually to answer; who comprehended its construction, and designed its use.[6]

The Argument from Design, which Kant called the physico-theological argument, held the field largely unopposed until 1859, excepting the eighteenth-century rationalist philosopher David Hume's (prior) objection that the design of Nature did not logically permit any

conclusion about its *cause* and that, echoing theories of Lucretius and the ancient Greek Atomist philosophers, "chance permutations of particles falling into a temporary or permanent self-sustaining order may simply give the *appearance* of design". However, putting Hume and those ancient thinkers to one side for the moment, it was after the publication of Darwin's *Origin of Species* that the antagonism more familiar to us between religion and science began to develop more markedly. That said, it should at the same time be added that Darwin represented a 'tipping point' amidst a mood of unease which had been gathering pace for some decades.

In 1831 John Stuart Mill concluded that the present era, where the predictable continuities of old agrarian economies had been increasingly ousted by the unlovely incursions of industrialisation, was one in which people had "outgrown old institutions and old doctrines, and have not yet acquired new ones". Both Matthew Arnold's 'Dover Beach', where the poet famously hears "the melancholy, long withdrawing roar" of "the sea of faith", and Tennyson's *In Memoriam*, a poeticised funeral oration on the unexpected loss of his friend, Hallam, which leads the poet to "falter where I firmly trod" on the "world's altar stairs/That slope thro' darkness up to God", were written some years before 1859. Tennyson's poem has even been adduced as a harbinger of the theory of natural selection where the

poet describes Nature "red in tooth and claw" as being "so careful of the type [=species] [...] So careless of the single [= individual] life". The savage voice of Nature in that poem tells of the thousands of species that have been wiped out, and that the holy spirit is reduced to mere "breath", and man to "desert dust". Those particular lyrics were probably influenced by Tennyson's reading of Lyell's *Principles of Geology* where he will have encountered the author's discussions of the extinction of species throughout the earth's history as they found themselves unable to cope with their environments.

It was clear that Darwin's theories were inimical to a literal reading of the Biblical Creation narrative, but by the 1860s by no means all were Biblical literalists: Lyell's findings had all but disproved the Biblical Flood narrative almost three decades earlier. It is also worth pointing out that even in the medieval and Early Modern periods period there had been a tradition of a nuanced reading of the Bible on a number of levels beside the literal (what was termed the four-fold exegesis). As David Knight has pointed out,

while our ancestors took it for granted that the Bible was the word of God, and literally true, they read or heard much of it as they would a great poem or play to be mulled over at more than one level.[7]

But now there appeared a more insidious threat which began to agitate people more than the precise truth-status of *Genesis,* and this was the sense of an encroachment of science into areas heretofore reserved for theology: the mind and soul.

Whilst science had eroded some theological territory before this time, by the 1860s its increasing threat grew into a kind of pincer movement which included the influence of the Biblical Higher Criticism from Germany (which essentially submitted sacred texts to the same kind of dispassionate, forensic evaluation as secular ones). This trend was exemplified by the South African Bishop Colenso's *The Pentateuch and the Book of Joshua Critically Examined* (7 volumes, 1862-75), or the fearlessly demythologizing *Essays and Reviews* authored by six ultra-liberal Churchmen (1860) which treated the Bible essentially like a secular text. David Strauss's *Life of Jesus*, translated into English by George Eliot (*nom de plume* of Mary Ann Evans, 1846), which emphasized Christ's humanity rather more than his divinity, was another influential publication in the same vein. However, many British readers failed to appreciate the semantic halo customarily attaching in its native country to the term *wissenschaftlich* (scientific) when applied to cold-eyed analyses of their King James Bible, and indeed the unfortunate Colenso ended up being arraigned for sacrilege in the ecclesiastical courts.

Not unexpectedly, then, there was popular resistance to Darwinian notions. A forum for scientific discussion about the alarming new subject of creation and evolution, the Victoria Institute, was formed in 1865, and its influence and activities endured well into the first half of the twentieth century. The Institute was rebranded in 1932 as the Evolution Protest Movement which issued the following statement of purpose:

We feel the public are being deceived. Evolution propaganda does not present the facts impartially; it dwells upon those which favour the theory, while suppressing those which oppose it. Such are not the methods of true, but of false, science. Few people realise that the tactics which Evolution employs would be regarded as 'special pleading' in a Court of Law; and that many scientists have declared that Evolution is both unproved and unprovable.

The scientific brains behind the reconstituted organisation, Douglas Dewar, published two serious technical works which strove to show what the "extraordinary fallacies" of Darwinism consisted in.[8] Resistance was also apparent in contemporary newspaper reporting, as Alvar Ellegård documented.[9] Here it is noteworthy that a good deal of the opposition came not from wounded religious sensibilities but from common-sense objections arising from people's

instinctive trust in everyday forms of logic. The theory of the survival of the fittest which Darwin appropriated from Thomas Malthus to spearhead his view of life in the animal world as an existential struggle was commonly rejected since "the habitat in which animals have been placed gives them a sufficiency of resources". Against the Darwinian claim that over 'deep' time there must have been manifold instances of evolution of one species into another, it was argued that there was "no tendency, in a creature fitted for one sphere, to usurp that of another". People could accept that the weak might be weeded out without accepting that the fit would necessarily get fitter: there was little acceptance that the process of natural selection could be creative. The whole Descent-with-Modification theory of animal metamorphosis was widely rejected for being 'imaginary', especially since readers had noted that Darwin himself admitted that the fossil evidence was simply not there (yet) to support his claims.

Although people were inclined to accept the notion of evolution – which had already gained currency in various forms well before Darwin – they baulked at the idea of natural selection. 'Things do not happen by chance' was the frequent riposte: forethought, planning, *design*, would have been necessary to effect such momentous changes as Darwin proposed. Towards the end of the century such sceptics were to find an articulate champion in the unlikely form of the novelist,

Samuel Butler, little remembered today except by students of literature (and then probably only in the context of 'survey' courses). He is best known as the novelist who wrote *Erewhon* and *The Way of All Flesh*, satirical indictments of Victorian England's major institutions – the family, the Church, and snobbishly hierarchical class structure. Butler was an early supporter of Darwin whose early enthusiasm turned to disenchantment.

A complex and latterly somewhat disturbed personality, he spent a full decade of his life researching the subject of evolution. He had no scientific credentials for this task beyond a stint of sheep farming in New Zealand in the 1860s but applied himself with such assiduity to the task of debunking Darwin (by whom he had felt slighted over an intellectual copyright issue) that he became shunned by polite society and totally ostracised by those of the Darwin party. Hoping to find a refuge in Science from his first spiritual home, the Church, he found to his cost that, as Malcolm Muggeridge put it, "Science could be as dogmatic as any Church, and with less justification, and its devotees as bigoted as any country clergyman."[10]

Among the more venial faults he arraigned Darwin for was plagiarism[11] – for which there was a sound basis: Darwin's biographers consistently report that he was little inclined to acknowledge his intellectual debts, excepting the fulsome praise he gave to Malthus

and Lyell. More substantially, Butler found the very mechanism of natural selection unconvincing. In his book *Luck or Cunning as the Main Means of Organic Modification,* he went into exhaustive detail on this issue, sometimes indulging in some rather monomaniacal streams of consciousness, bearing witness to the obsession the subject of evolution had become for him. For Butler, Darwin had muddied the waters of the heretofore teleological territory of evolution by what he saw as the illogical and distinctly un-teleological postulate of natural selection.

Although Butler had lost his Christian faith in the conventional sense he still retained a sense of what we might now term 'spirituality' or, as his modern biographer noted, a belief in vitalism: "So he substituted for the exploded idea of instant, once-for-all creation a belief in the essential unity of life, life with a sense of will, purpose and progress".[12] Undeterred by any Arnoldian or Tennysonian mawkishness, Butler would appear, in company with many later Victorians including William Hale White's semi-fictional figure of 'Mark Rutherford',[13] to have taken Wordsworth as his guide. In that poet's famous 'pantheistic' lines in 'Tintern Abbey' he reports being able to see into the life of things in a passage suggestive of the kind of divine immanence that Butler envisaged:

And I have felt
A presence that disturbs me with the joy
Of elevated thoughts; a sense sublime
Of something far more deeply interfused,
Whose dwelling is the light of setting suns,
And the round ocean and the living air,
And the blue sky, and in the mind of man;
A motion and a spirit, that impels
All thinking things, all objects of all thought,
And rolls through all things.

Butler denounced adherents of the Darwinian theory for being "apostles of luck". For him organic evolution did not depend on luck but "cunning" – a word he used in an idiolectal sense denoting something akin to a preconceived, thought-out natural law animating all nature. In this, Butler was giving his accomplished writer's voice to opinions circulating in the press and on the streets a few decades earlier, indicating that Darwin's attempt to delete any animistic notion from his wholly material theory of natural selection frequently fell on stony ground. Most readers thought some 'law of development' (what Bergson, at a later date, would term the *élan vital*) must have been implanted by the Creator as the necessary *motor* of evolution.

Creation and Evolution.

Those looking into the subject of creation and evolution may at first be somewhat surprised to find the names of pre-Christian Greek and Roman authors liberally referenced even in up-to-date discussions of the subject. It may at first appear incongruous that the names of philosophers belonging to what we now deem a largely pre-scientific era should be thought to have anything useful to contribute to the subject. However, when it comes to the topics of creation and evolution, there is quite literally nothing new under the sun. Those grand existential themes have been the subject of human speculation for millennia, and because the modern scientific method can take us only a limited way to understanding these eternal mysteries of the human condition, even modern scientists are thrown back on the resources of intelligent speculation to fill the gaps that 'hard' science cannot answer. Whereupon they find that Ancient predecessors had made the attempt to answer precisely the kinds of questions that they in their lab. coats are grappling with.

In a study entitled *Narratives of Human Evolution*[14] palæoanthropologist Misia Landau identified commonalities in ancient and modern speculations and debates, some of which she saw as conforming to age-old story patterns in folklore and myth. Accordingly, she

made the case that scientists could gain much from an awareness of archetypal narrative structures, memory of which can sometimes exert a subconscious influence on their interpretation and presentation of evidence. Rather like the way we are tempted to embellish narratives in everyday life to amuse our interlocutors, the choice of narrative mode used to explain evidence, she argued, can trigger an albeit unconscious interference and predispose a bias towards traditional and readily intelligible patterns of understanding – with the dangerous potential to tempt researchers beyond their sometimes limited empirical evidence.

Some of Landau's colleagues were, not surprisingly, taken aback to have their self-conceived pristine objectivity questioned by the implication that they could be tempted to manufacture 'creation myths'. However, leaving aside how this particular matter may be, Landau's general point, it appears to me, provides a sensible note of caution, and it seems advisable to view Darwin's evolutionary ideas against the background of a preoccupation beginning some six centuries before the birth of Christ and continuing (albeit with large historical interruptions) to the time of Charles's grandfather and thence to prominent nineteenth-century near-contemporaries of Charles himself.

Such a contextualisation seems particularly important in Darwin's case since his *Origin of Species*, whilst incontestably based on the precise empirical

evidence of many years of minutely observed fieldwork, had a very large dimension of 'natural philosophy' to it. This, especially in the context of the nineteenth century amateur-naturalist tradition to which Darwin, as a non-university practitioner, belonged, meant essentially the application of intelligent speculation to the putative mainsprings of natural phenomena. In addition, although Charles himself chose not to flag up his debt, he was clearly influenced by the ideas and writings of his grand-father (some of Erasmus Darwin's books have been found to have his grandson's signature in them and to have internal written markings). Not only did Dr Erasmus inaugurate what has been jocularly termed the Darwinian cottage industry of evolutionary speculation, but also (being unarguably more gifted than his grandson in purely scholastic terms), was well acquainted with the Classical works of natural philosophy, in particular the *De Rerum Natura* (*On the Nature of Things*) of Lucretius, on whose poetic conceptions he based some of his own verse poems, as will be observed later below.

Let us, however, begin at the beginning. Surviving written records indicate that speculation about the origin and development of the world began with the Greek Anaximander (611-547 BC) and his follower Anaximenes (588-542 BC) who thought that the earth was initially muddy and that out of this primordial slime there arose first plants and animals, then (wo)man. At first partly aquatic, humans subsequently moved their

abode to land. Notably, Anaximander's wholly naturalistic explanation of things did away with the necessity for invoking mythological explanations involving the Greek gods. Common to both ancient and modern debates about creation and evolution is a tension between the argument for divine creation-cum-superintendance and the opposing argument which strives to exclude god(s) so as to seek explanations for the phenomena of life along strictly material lines.

In the Homeric and Virgilian epics and in other imaginative literature of the Greek and Roman worlds the numerous deities (often personifications of natural forces) appear in directly interventionist roles, but their existence was vehemently disputed in a number of ancient philosophical traditions. For philosophers such as Empedocles, Democritus, Epicurus, and Lucretius, life is not a divine creation but simply an emanation of the natural flux of things, part of a common continuum with the sea and sky. Empedocles addressed the problem of the world's complexity by speculating that the flux threw up all sorts of different shapes and objects generated at random by the chance interaction of elements. One text above all others from Roman antiquity appears to have exerted a particular influence on the post-1700 world, the *De Rerum Natura/ On the Nature of Things* by the philosopher-poet, Lucretius (c.50 BC). This work also influenced more than one

generation of the Darwin family, as will become clear below.

The ultimate inspiration for Lucretius's extended verse poem was a philosophical treatise, *The Art of Happiness* by the Greek, Epicurus (342-270 BC), whose austere propositions were transposed by Lucretius into a more accessible verse form which enabled it eventually to capture the imagination of European posterity. What was the essence of the Epicurean philosophy versified by Epicurus's Roman disciple and what is its relevance to the Darwins? Let us begin with its fundamental propositions which may be summarised as follows:

The universe, it is proposed, is mindless and without creator, being a purposeless and non-intelligent concourse of atoms without any cosmic source of direction sustaining it. Its invisible particles or atoms are constantly in motion, jostling against one another without guidance or direction. There is no end or purpose to existence, only ceaseless mutation, creation and destruction, governed entirely by chance, in which atoms swerve around now this way, now that. Since there is no original scene of mythic creation to be invoked, it was proposed that plants and animals had evolved via an extended process of trial-and-error. This random process, which had continued over immeasurable tracts of time, had been responsible for the gradual evolution of all species, animal and human. In some cases that evolutionary journey had been unsuccessful, resulting in creatures not properly equipped to compete for resources or to create offspring, and which

succumbed to extinction – in contradistinction to perfectly formed creatures able to adapt and reproduce.

Despite appearances to the contrary, things come about by happenstance rather than by design: sight did not exist before the birth of the eyes nor speech before that of the tongue (i.e. these organs were not created purposefully for our use). Language was not a divine gift. Humans, like animals, experienced vocalisations which they were able to share and synchronise to designate the same thing, and over time bring about greater intelligibility through further trial-and-error. Music was developed by humans' imitating of the warbling of birds. The earth was not created for human habitation, and it is a delusion to suppose we have a central position in it: there is in fact no reason to give humans a status greater than other animals with which they share many similar qualities. Humans are also part of a larger material process which links them to inorganic matter as well as to the animal world, even to the stars in the sky.

The origins of humans did not occur in some paradisal location but in a primitive battle of survival (of the fittest), struggling to eat and to avoid being eaten – although some rudimentary capacity for communal living did at length evolve. There is no soul and no afterlife, and nobody should be concerned about his/her death since neither a paradisal nor an infernal fate awaits us at the end of our days. No need then to believe in the superstitious delusions promulgated by religion since people's fantasies about superior beings in the heavens who must be propitiated are without foundation. There are no Fates, harpies, daemons, genii, satyrs, dryads and the like. Such delusions are simply obstacles to our

happiness. We are exhorted to forsake the cruelties of religion which demand ascetic self-denial, violent retribution and (in the Classical world) even human sacrifice (as in Agamemnon's sacrifice of his daughter, Iphigenia, or, in the Judaic Old Testament tradition, the Abraham/Isaac story). Bearing in mind that the Greek pantheon of gods was nothing if not fractious and not uncommonly homicidal, emancipation from such harmful fancies will confer happiness on human kind, it is urged.

The above summary unmistakeably shows up prototypical expressions of ideas favoured by Charles Darwin, because, as Neal Gillespie pointed out, Darwin's "vision of a masterless and undesigned nature brought with it hints of ancient atomism and its attendant atheism".[15] The trial-and-error development of life described in Lucretius foreshadows in some sense the notion of natural selection, whilst the idea of animals too weak or ill-adapted to compete with their fellows brings to mind the Malthusian/Darwinian idea of the survival of the fittest. The contention that living beings are constituted of the same substance as the rest of the observable cosmos also appears to prefigure later scientific findings of the common substance informing both sentient life and inanimate matter – which we now know to be carbon. It is surely no mere coincidence that Renaissance scholar Stephen Greenblatt reports that he experienced a shock of recognition when, as a young student, he first encountered Lucretius's writings.[16] He

was struck by the familiar atheistic tenor to which he had been exposed in the elite intellectual circles in which he moved in late twentieth century America, circles which by that time had been adjusting to the influence of Darwinism for more than a century.

The ancient Greeks were not experimental scientists but thinkers who brooked no constraints on their speculative flights. The Atomists were good at producing "bold metaphysical postulates" but

the Greeks neither understood nor employed experimental method to any significant extent. In certain cases they erected brilliant hypotheses, such as the atomic theory, and then dogmatically asserted the truth of such hypotheses without rigorous testing.[17]

Whatever reservations might be held about the truth-status of their ideas, however, it was more the sacrilegious nature of the Epicurean/Lucretian take on the world that proved so unacceptable to both ancient and medieval people. Hence atomism as a theory of reality swiftly disappeared from view and was not much visible until the seventeenth century, when it was resurrected by the Jesuit Pierre Gassendi, a contemporary of Descartes.

In fact, as Greenblatt has shown, the manuscript of the *De Rerum Natura* was physically lost to history for many centuries, and was rescued from oblivion only

when the Humanist scholar and ancient manuscript-seeker Poggio Braccioloni tracked down a transcribed copy of it in a German monastery in the first part of the fifteenth century. The poem's first translation into English came in 1682 from the pen of a young Oxford don, Thomas Creech, and this was republished throughout the eighteenth century. Hence its reintroduction into the European literary/philosophical canon came at a propitious moment coinciding with the beginning of the Enlightenment. By the end of the eighteenth century there is evidence that Atomist ideas influenced David Hume in his *Dialogues concerning Natural Religion*, where one of the disputants in the imagined debate tells us that, over vast swathes of time, matter itself can produce ordered forms having the *appearance* of design. God's design, on that argument, represents an unnecessary hypothesis.[18]

Although there was a growing tolerance (but not acceptance) of the content, and appreciation of the poetic merits of the *De Rerum Natura* towards the very end of the eighteenth century, the whiff of brimstone surrounding it meant that Sir Isaac Newton had earlier had to dissociate himself from its atheistic doctrine when he was publicly accused of "being a Lucretian". Erasmus Darwin was an open admirer of Lucretius as a poet and in part calqued his own natural science poems on the Lucretian model, as one contemporary critic noted when he wrote: "Dr Darwin, like Lucretius, has

endeavoured to blend in his poetical works the grave features of philosophy with the mutable graces and smiling charms of imagination."[19] However, it is noteworthy that Charles's grandfather, whilst admiring Lucretius as a poet, chose to dissociate himself from the Lucretian philosophy, here expressed in unambiguous (but possibly at the same time also defensive) terms through the medium of one of his odes:

Dull atheist, could a giddy dance
Of atoms lawlessly hurl'd
Construct so wonderful, so wise,
So harmonised a world?

Although Erasmus Darwin did not believe in divine revelation, he remained a theist, although it must be added that one of Charles's biographers, Janet Browne, has reservations about the *strength* of the grandfather's belief since the Darwin family were widely known to be freethinkers (many of his followers are known to have disbelieved special Creation), and his philosophical conjectures as expressed in his poetry were nothing if not rather *outré*. His *Temple of Nature* for instance mooted the possibility of life having emerged from the depths of the oceans and evolving into different species in response to a striving for perfection in different environments (the idea most closely identified with Lamarck in the nineteenth century). It is perhaps

telling that initially Erasmus had doubts about publishing his poem *Zoonomia or the Laws of Organic Life* because he feared accusations of heresy, and, indeed, when it *was* published, it acquired the distinction of being banned by the Pope. Be that as it may, his conception of the beginning of the world and the subsequent evolution of its denizens was ostensibly 'sound' theologically, as he sought to show in these oft-cited words:

Would it be too bold to imagine, that in the great length of time, since the earth began to exist, perhaps millions of ages before the commencement of the history of mankind, would it be too bold to imagine, that all warm-blooded animals have arisen from one living filament, which THE GREAT FIRST CAUSE endued with animality, with the power of acquiring new parts, attended with new propensities, directed by irritations, sensations, volitions, and associations; and thus possessing the faculty of continuing to improve by its own inherent activity, and of delivering down those improvements by generation to its posterity, world without end!

Whatever Erasmus Darwin might have meant precisely by the term "filament" is unknown but it is generally held that he was referring (in modern terms) to a very small, possibly unicellular entity which thereafter branched out and developed into a series of larger

species – all presumably under God's continuing superintendence since Erasmus did not subscribe (officially at any rate) to the 'absentee landlord' conceptions of the eighteenth-century Deist creed. His grandson's theory of natural selection, on the other hand, as the term implies, was framed to explain human evolution in *wholly* naturalistic terms.

Turning now to Charles's contribution to evolutionary theory, the first thing to note is that he was anything but innocent of the battles royal that had been raging on the subject for the better part of a century, and that his *Origin of Species* was in one sense only part of a larger corpus of pre-existing evolutionary thought.[20] Consideration was given above to the contributions of the ancient, Classical world to this perennial philosophical debate, but it was not until the eighteenth century that the beginnings of modern ideas of evolution were to take shape. The founding father of this modern discipline was the Swedish botanist, Carl Linnaeus (1707-78), whose opinion was that species do not change and that all living things were created as they can be observed today. On that basis he classified them into fixed groups which he identified with the descendants of the original forms made by the Creator. His work was highly influential, to the extent that Linnaean categories are still referred to with profit today by animal taxonomists.

In the footsteps of Linnaeus came Georges Cuvier (1769-1832), whose numerous areas of expertise included zoology, comparative anatomy and palaeontology. Cuvier discovered that the fossil vertebrates could be placed in a sequence from fish to mammal, but he did not conclude that the sequence indicated that one form had descended from another. Rather was it the result of a succession of separate creations. Another French scientist, Georges Leclerc Buffon (1707-88), with a stupendous 44 volume *Histoire Naturelle* to his considerable name, was an early proponent of the evolutionary idea, challenging the fixed categories of the Linnaean system of classification. Buffon held that living things evolved and that species would advance or regress as their environment changed, but, unlike Darwin in future time, did not specify how these changes might occur.

A notable follower of Buffon was Jean Baptiste Lamarck (1744-1829), who advanced the idea that some organisms might have developed from previous ones. He even put forth the idea that an animal could develop new organs in response to its need to operate in a changing environment. Such new traits acquired would then be inherited and so contribute to the development and evolution of a species (an idea rejected by the scientific establishment of the day and by Charles Darwin, who, however, later in life expressed some sympathy for Lamarck's approach). A later French mineralogist and

zoologist, Geoffroy Saint-Hillaire (1772-1844) developed the observation that, since all animals have similar physiological structures, that they must at some point be related, and that the higher forms must (somehow) have arisen from the lower ones.

Hence by the first part of the nineteenth century it is possible to see that a number of ideas were in currency and that a degree of 'cross-pollination' of these ideas was in process. It has for instance been noted by many that Lamarck's ideas were very close to those of Erasmus Darwin, whom Lamarck may well have read, given Dr Erasmus's then fame. That fame may well have spread to Goethe in Germany, whose profile as a writer was similar to Dr Erasmus in that his wide interests included science as well as his creative works (although he did not blend them into his literary *oeuvre* as did Dr Erasmus or Lucretius). In his *Essay on the Metamorphosis of Plants* (1790), Goethe argued that botany was in a state of flux, one species deriving from another, and that all life, plant, animal and human, derived from a single source.

In a case of wheels within wheels, the works of both Lamarck and Erasmus Darwin were well known to an Edinburgh tutor of Charles's, Robert Grant. An admirer of Erasmus Darwin, Grant did not believe that animals were creatively designed and talked of sponges as the ancestors of higher animals, an idea similar to Lamarck's conviction that higher animals had evolved

from simple worms. Charles is known to have had prolonged conversations with Grant as indeed he did with his Cambridge tutors. This enviable knack of developing companionable relations with his academic tutors and sharing in their intellectual discussions might at first glance strike us as a case of 'name recognition' opening doors to a Darwin which might have remained closed to less well-connected students, especially in the very English context of a then totally unreconstructed old boy network in which it was often who rather than what you knew which proved the greater advantage. However, this does not account for Charles's sustained discussions with men who were the very antithesis of intellectual gadflies and who would have been able to see through their charge in an instant had his interest in their subject specialities been in any sense feigned. Hence it is likely that the discussions of Grant and Darwin will have ranged widely to include Grant's then heterodox views on life and evolution.

Dr Erasmus Darwin's stature both as naturalist and poet at the time might come as a surprise to people of the twenty-first century, but it tells us much about his stature in the eighteenth century that William Paley's *Natural Theology* was written in part to defend the argument from design against Dr Erasmus's claim that adaptation was a natural process resulting from the purposeful activities of living things (the doctrine commonly referred to as Lamarckism although Lamarck

may well have derived the idea from Erasmus Darwin). Another clear indication of his contemporary stature is found in the fact that he became the 'target' of Wordsworth and Coleridge in their Preface to the 'Lyrical Ballads' (1798). That famous manifesto of the Romantic credo disavows the elegant but rather high-toned Augustan phraseology used by Dr Erasmus in favour of the more natural language of common people. The albeit negative acknowledgement of the fame and pre-eminence of Dr Erasmus by two celebrated Romantic poets makes it probable not only that Lamarck would have read him but that a good deal of what his grandson was to publish in future time might have been derived from Erasmus too, as this section of one of the grandfather's poems shows:

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:
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,
The lordly lion, monarch of the plain,
The eagle soaring in the realms of air,
Whose eye undazzled drinks the polar 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 embryon point, or microscopic ens![21]

In the context of Darwin's precursors, mention should also be made of another work in the field written by an (at first) anonymous English-speaker which, although more or less wholly forgotten now, in its day fully lived up to the name of 'Victorian Sensation' (the title of James Secord's voluminous study).[22] The author, Robert Chambers, fearing ecclesiastical opprobrium, very effectively kept his name concealed right up until his death-bed (although Charles Darwin correctly guessed his identity a few years after its publication). The book was entitled *Vestiges of the Natural History of Creation* (1844), and it provides a form of encyclopaedic summation of what was known by the 1840s in the fields of biology, cosmology, geology and other specialist fields, written by a well-informed layman for a mainly middle-class readership. When Darwin read it, he was a little taken aback by the similarity of some of its ideas to his own, for which reason I shall give a brief summary to facilitate the comparison:

From the start Chambers fixes his colours to the mast, rejecting the Judeao-Christian narrative as put forth in the

King James Bible. In its place he puts a strictly materialist explanation for the creation of life on earth. He explains that the whole of the firmament was initially a diffused mass of "nebulous matter" (intergalactic gases). Over an unknown period of time, the stars, galaxies, sun and Earth formed. At first, the absence of any traces of plants and animals from metamorphic rocks shows that "excessive temperatures prevailed" during the earth's early history which could not have supported life. Citing the work of the foremost geologists of the time, Lyell, Sir Roderick Murchison and Darwin's Cambridge tutor, Adam Sedgwick, Chambers concluded that organic life began after the appearance of dry land on the face of the earth. Dry land, he explained, will have emerged over the aeons through a combination of sedimentation and an upward thrusting of rock by forces not yet properly understood. With dry land there emerged "a theatre for the existence of plants and animals". The simplest forms emerged first (Chambers rejected the Biblical Genesis narrative in favour of spontaneous creation) followed by the more complex. He stated that The Almighty would not have brought forth each individual species through the exercise of "immediate exertion". The Earth and whole solar system came not from a one-off divine creation but from natural laws which were still, Chambers is careful to point out, "the expressions of His will". He develops that thought by explaining that it would be a narrow view of the Deity "characteristic of a humble class of intellects" to suppose Him acting in particular ways for particular occasions. Chambers lends his support to the doctrine of 'secondary creation' via natural regularities assuming the function of divine mandates.

Chambers saw a linkage between the most simple and more complex beings in the great "chain of being" (the ancient idea of a *scala naturae*). To explain this connectedness among different animals, he proposed "transitional forms" between species. This ladder of organic life did not appear all at once, as stated in the Bible, but developed over aeons of geologic time. He stresses the biological continuum linking beast and man by explaining that the human foetus shows a similarity to that of an ape but that these features are "suppressed" before the baby is born and the infant goes on to become a "true human creature". In his peroration, anticipating the hostility that this latter contention would produce, he attempts to head off any "prejudiced and supercilious" objections by pointing out that all creatures great and small are a part of the Divine Conception: "Let us regard them all in a proper spirit, as parts of the grand plan".

It would be no exaggeration to claim that the Victorian public was transfixed by *Vestiges* (as it became known in the absence of an unidentifiable author). Darwin's future rival, Alfred Russel Wallace, reading it in the autumn of 1845, was electrified by its arguments. Chambers' theory of what he took to be "progressive development" convinced him of the truth of organic evolution. And precisely because the myriad new facts and conjectures advanced by Chambers did not actually explain how the various animals and plants had assumed their distinctive character, Wallace was inspired to work

at the 'how' of the origin of species for himself. Darwin, distancing himself from the negative reviews of *Vestiges* penned by orthodox Christian readers like Adam Sedgwick, the Cambridge geology professor, and seeing all-too clearly the similarity of the Chambers argument to his own, diplomatically gave measured praise to a volume which, as he put it, "despite its deficiencies, spreads the taste for Natural Science".

Amongst the general public *Vestiges* became something of a *succès de scandale* with its scripturally unattested notions of creation-without-a-creator and of Nature operating largely independently to produce its plethora of life forms. It has been plausibly suggested that the *furore* caused by *Vestiges* in the public mind may even have deterred Darwin from including in his own work any extended consideration of the spontaneous creation of life, even though he was drawn to the idea and that it provides the essential logical lynchpin for his own conception of natural selection. The reason that a purely chemical creation of first life on earth is so essential to the Darwinian conception of evolution is that his ascent-of-man narrative depends on the claim that very simple organisms have evolved over time towards supremely complex ones. That narrative depends on an incremental development from low to high or – in Jacques Barzun's laconic formulation – the basic narrative proposes a one-celled organism "which has had advantageous faculties added to itself by a series

of happy chances".[23] Richard Dawkins, Darwin's modern expositor, explains the first emergence of life on earth as a "gradual, step-by-step transformation from simple beginnings, from primordial entities sufficiently simple to have come into existence by chance".[24]

One might wish to pause over the truth-status and indeed even the logic of Dawkins's notion of "entities sufficiently simple to have come into existence by chance" and establish whether such a notion can be supported by experimental evidence – especially since recent advances in microbiology show that the humblest bacterium contains more genetic information than the instruction manual for NASA space probes. The very notion of a simple biological entity has become deeply problematical with our increasing knowledge of the molecular world in the last half century, and one might therefore wish to query whether such a thing can exist in nature. Happily, we are in the position to be able to test the claim empirically because twentieth-century scientists were naturally drawn to test the idea which had received Darwin's cautious endorsement.

The most notable experiment to investigate the possibility of generation of life on Earth was carried out by Stanley Miller and Harold Urey of the University of Chicago in 1953. On the face of it, it might appear incongruous that modern-day scientists would touch this subject with a bargepole. Up until the middle of the nineteenth century, to be sure, a form of pseudo-

scientific folk-belief was doing the rounds according to which rotten material and even soiled linen was supposed to be able to induce the formation of small life-forms. In the 1860s, however, renowned French scientist Louis Pasteur had disproved the theory of spontaneous generation: only life can produce life, he demonstrated. Strangely, though, the outmoded faith in spontaneous generation did not die out completely, and both the Russian biologist Alexander Oparin and the British scientist John Haldane had revived the idea in the 1920s. The somewhat questionable logic behind the 1950s experiment –which from the perspective of posterity appears to have been a rather desperate venture – has been described as a trial to find out if life-from-nonlife, although not usual, perhaps "*did* belong to the realm of the unusual and long ago"[25] and that state-of-the-art 1950s know-how would be able to succeed where predecessors had been proved wrong.

Miller and Urey theorized that, if the conditions prevailing on the primeval Earth were reproduced in laboratory conditions, they might be able to put in place conditions conducive to a chemical synthesis of living material. In accordance with the best scientific information at the time, they filled their laboratory receptacle with methane, hydrogen, ammonia and water – all of which were thought to have been constituents of that early terrestrial atmosphere whose conditions the pair were attempting to simulate. At this point, an

electric spark was passed through the chemical mixture to simulate what scientists term 'an energetic event', that is, the kind of energy which could have come from thunderstorms on primeval Earth. The resulting liquid turned out on analysis to contain amino acids which, though not living molecules themselves, are the building blocks of protein which is essential to the construction of life.[26]

In 1953 there were high expectations that the next step from amino acids might lead to the first replicating organisms. The media of the time certainly hoped so, with *Time* magazine reporting of the two experimenters:

What they have done is to prove that complex organic compounds found in living matter can be formed. If their apparatus had been as big as the ocean, and if it had worked for a million years instead of one week, it might have created something like the first living molecule.

The astronomer, Carl Sagan, adjudged the experiment to be an important first step in the direction of the actual creation of life, declaring that "The Miller-Urey experiment is now recognised as the most significant step in convincing many scientists that life is likely to be abundant in the cosmos". The experiment was kept at the forefront of people's attention by continuing reportage in the press, and found its way into school and university

biology textbooks and museum displays, and the impression was fostered that an energy source could indeed initiate a reaction leading to the formation of life's building blocks.

At one level of apprehension at any rate, this idea seemed intuitively 'right' to the many journalists and members of the public acquainted with Mary Shelley's *Frankenstein* (1818) or else with the classic 1931 film of the same name – all the more so since the imaginative genesis of Mary Shelley's science fiction appears to have had a substantial basis in science fact. In a recent study, *Raising the Dead. The Men who created Frankenstein,* Andy Dougan claimed to have found an historical prototype for Baron Frankenstein. He noted that Percy Shelley, in his Preface to his wife's novel, makes reference to "Dr [Erasmus] Darwin and the physiological writers of Germany" whose work, Shelley stated, suggested that the story that followed was "not of impossible occurrence".

Who Shelley had in mind when referring to these German writers is not entirely clear. The names of Alexander Humboldt and Johann Wilhelm Ritter have been mooted, but Dougan points to two candidates, the first being the professor of surgery and Royal Prussian physician from 1817-29, Karl August Weinhold, whose *Experiments on Life and its Primary Forces through the use of Experimental Physiology* had appeared in 1817. In his publication, Weinhold describes a number of

frankly bizarre experiments on dead animals which, upon receiving electrical shocks, 'revived' in the limited sense that the corpses exhibited involuntary spasms. He also contended that electricity could revive brain function and restore the dead to life, although, since his experiments were conducted behind closed doors in his university laboratory, there is no proof of his claim.

In my view, however, it seems equally likely that Dougan's other mooted candidate, Percy Bysshe Shelley himself, might have been the prototype of the restless over-reacher. Shelley was certainly an important *éminence grise* behind his wife's creative endeavours. He is known to have consulted many treatises on electricity and galvanism. Interested in Paracelsus, the 16th century alchemist and physician, and also in Sir Humphrey Davy's theories on the conversion of dead matter to living (which Louis Pasteur was to disprove only later in the nineteenth century), the poet himself carried out experiments with electricity (to the extent of electrocuting *himself*),[27] which he understood to be the animating force of life. His wife's book, which Janet Browne records as having been inspired in part by Percy Shelley's talk of Erasmus Darwin's preserving "a piece of vermicelli in a glass case till by some extraordinary means it began to move with voluntary motion",[28] was subtitled *The Modern Prometheus*, a description suggested by the hubristic figure of Ovid's *Metamorphoses* who stole "particles of heavenly fire"

(probably meaning lightning) from the abode of the gods. When Ovid took over the myth associated with Aeschylus and Hesiod in the Greek tradition he (or possibly unknown Roman predecessors) developed it to make of *his* Prometheus a figure who creates and manipulates men into life: a *plasticator*. The particles of heavenly fire were the means by which he quickened his clay images into life, a conception of (re)animation which occurs in an only slightly different form in *Frankenstein*.

Experiments with galvanism were not uncommon in the first three decades of the nineteenth century. In the same year as *Frankenstein* appeared, Adam Ure in Glasgow set out to 'reanimate' the executed criminal, Matthew Clydesdale (causing predictable convulsions but little else). Interest in such experiments waned towards the middle of the nineteenth century, but surprisingly, just six years before the Miller/Urey experiment took place, Robert Cornish of the University of California had everything in place in a university laboratory to attempt to reanimate by electric shock the corpse of a recent death row inmate, one Thomas McMonigle – a procedure he would have carried out had not the University authorities sensibly stepped in to halt proceedings.

Given the presence deep in even educated persons' collective imagination of a tradition of (re)animation (a psychological phenomenon which the

Germans term 'versunkenes Kulturgut' – with its connotation of 'sunk, but never without trace'), the media interest in the Miller/Urey experiment is unsurprising, but the complete chemical pathway devoutly hoped for by many in its wake was not to materialise. In fact, the unlikelihood of such a materialisation was underscored in the very same year that the Miller-Urey experiment took place, when Francis Crick and James Watson succeeded in identifying the famous double helix of DNA. The significance of this discovery for the American experiment was that it showed that, even if amino acids could be somehow induced to form proteins, this would *still* not be enough to produce life. The full picture was more complex.

Life depends on both proteins *and* nucleic acids, of which deoxyribonucleic acid or DNA is one type and where the vital information needed to replicate and operate any given organism is encoded. Both proteins and DNA must be able to work together. DNA is both highly complex and highly specific (to the extent that just small differences in its 'letters' could make the difference between a rhinoceros and a flea). Proteins are indispensable but they do not have the capacity to store and transmit information for their own construction. DNA on the other hand *can* store information but cannot manufacture anything or duplicate itself. Something of a chicken-and-egg situation – so much so that Francis

Crick was once moved to comment that the beginnings of life seemed impossible, barring a miracle, since "so many are the conditions which would have to be satisfied to get it going".[29]

Finally, it had to be conceded, life was unlikely to form at random from the so-called 'prebiotic' substrate on which scientists had previously pinned so much hope. (To this day, biochemists remain ignorant of the modalities of a jump from amino acids to proteins and they know nothing at all about the origin of nucleic acids). To complicate things even further, it is now widely disputed whether the early atmosphere of the Earth postulated by Miller and Urey would have been such as they assumed, and so it may not have supported the formation of the organic compounds they identified. Hence the problem appears now to extend to include the origin of the basic building blocks themselves. The triggering of 'abiogenesis', even granting its possibility, might well, then, require a wholly new set of conditions about which nobody yet has any knowledge whatsoever (or of course it might, *horribile dictu*, even be impossible in nature!).

The hope that life may be somehow 'dormant' in chemicals, waiting to be unlocked when the correct chemical combination numerals clicked into place, as it were, had clearly suffered a signal reverse. The large claim that life could arise from a reaction within any chemical substrate possessing the requisite prebiotic

properties has, in addition, failed to be confirmed by recent space exploration. Had the twentieth-century Viking space mission been successful in finding evidence of even rudimentary life on the Martian surface, it might have been taken as confirmation by analogy that terrestrial life had emerged from a comparable chemical matrix. However, the space searches found no incontestable evidence, and the failure to find evidence of 'exobiologies' based on exotic chemistries means that there is less confidence now than there was in the 1980s that some autonomous 'cosmic imperative' might prompt the production of life wherever the 'right' geochemical conditions prevailed. The essential question of how lifeless chemistry might be translated into living biology remains unresolved.

Sporadic attempts have been made to continue the same principle and modus operandi as Urey/Miller. More recently it has been mooted that deep-sea thermal vents may have encouraged early life-forms, or that certain types of clay could have encouraged prebiotic chemicals to gather, but neither of these options has prompted much scientific support to date, and most experts have had to concede that the step from a barren, primordial world to one of life-producing chemistry remains, to use the term judiciously employed by one recent scientist, 'imponderable'. It is then curious that Dawkins can claim that "the results of these experiments have been exciting". He seems to place inordinate faith

in ideas which have yielded only negative results to date when he writes:

Organic molecules, some of them of the same general type as are normally only found in living things, have spontaneously assembled themselves in these flasks. Neither DNA nor RNA has appeared, but the building blocks of these large molecules, called purines and pyrimidines, have. So have the building blocks of proteins, amino acids. The missing link for this class of theories is still the origin of replication. The building blocks haven't come together to form a self-replicating chain like RNA. Maybe one day they will. [underlining supplied] [30]

As American philosopher Thomas Nagel noted: "I find the confidence among the scientific establishment that the whole scenario will yield to a purely chemical explanation hard to understand, except as a manifestation of an axiomatic commitment to reductive materialism." In fact, in a paper published this year entitled 'We're still clueless about the Origin of Life', Rice University professor of chemistry James Tour advocates calling a moratorium on origin-of-life researches on the grounds that "its overexpressed assertions jeopardize trust in scientific claims in general".[31] Special pleading-cum-wishful thinking only serves to reinforce the impression that the problem is likely to remain insoluble in scientific

terms, and does much to explain why some scientists have been drawn to look for alternative pathways to explain the origin of life on earth. One such alternative emerged in the theory that life did *not* originate on earth but rather in outer space. This idea, officially dubbed 'panspermia', was first put forward in 1903 by a Swedish scientist, Svante Arrhenius, who proposed that microbes ejected from planets harbouring 'life' (his locations were unspecified) travelled through space and alighted on earth. In 1973 Francis Crick and Leslie Orgel, concluding that the Arrhenius theory was unlikely, put forward the even more unlikely theory of 'directed panspermia', according to which an advanced civilisation 'somewhere' in the galaxy targeted the Earth and other planets with microorganisms. Latterly the panspermia idea has been most commonly associated with the late Sir Fred Hoyle and his younger colleague, Prof. Chandra Wickramsinghe. Their basic idea is that life became 'seeded' on earth from outer space, wafted in our direction by intergalactic forces, the equivalent of cosmic convection currents, or perhaps attached to or else embedded in meteors and then scattered and developed here on earth.

The whole idea was dubbed 'Hoyle's Howler' by no few biologists,[32] for even in the unlikely event it were true (which even Hoyle himself doubted latterly!), it is a complete *non sequitur* which does nothing to elucidate the mystery of creation. It simply relocates it to outer

space and so shelves the issue by 'kicking it into touch', to use the sporting metaphor, a fact emphasised by Michael Denton:

Nothing illustrates more clearly just how intractable a problem the origin of life has become than the fact that world authorities can seriously toy with the idea of panspermia. [...] *The failure to give a plausible evolutionary explanation for the origin of life casts a number of shadows over the whole field of evolutionary speculation.*[33]

What is particularly instructive about the panspermia debacle is the motive which gave rise to the conception in the first place. Those few old enough to remember Sir Fred's avuncular but no-nonsense manner on BBC TV and radio programmes in the 1960s and 70s will remember his famous analogy concerning the greater likelihood of a tornado sweeping through a junkyard and accidentally assembling a Boeing 767 than human life forming spontaneously on Earth. Viewers may also have read the first two chapters of his book, *The Intelligent Universe. A New View of Creation and Evolution*, chuckling at the bluff, North Country manner of his demolition of all things Darwinian in its first two chapters. "How" – Hoyle asks – "has the Darwinian theory of evolution by natural selection managed, for upwards of a century, to fasten itself like a superstition

on so-called enlightened opinion?" His response consists in another rhetorical question followed by his own response, which illuminatingly unmasks what Darwin, for tactical reasons, left vague:

So why do biologists indulge in unsubstantiated fantasies in order to deny what is so patently obvious, that the 200,000 amino acid chains, and hence life, did not appear by chance? The answer lies in a theory developed over a century ago which sought to explain the development of life as an inevitable product of the purely local natural processes. Its author, Charles Darwin, hesitated to challenge the Church's doctrine on the creation, and publicly at least did not trace the implications of his ideas back to their bearing on the origin of life. However, he privately suggested that life may have been produced in 'some warm little pond', and to this day his followers have sought to explain the origin of terrestrial life in terms of a process of chemical evolution from the primordial soup. But, as we have seen, this simply does not fit the facts.[34]

Hoyle's words clue us in on how abiogenesis and subsequent evolutionary processes must necessarily go together like the proverbial horse and carriage, and also give a good indication as to why he should have been driven to develop the rather desperate theory of panspermia in succeeding chapters (which must have

truly shocked his readers in 1983 for whom Hoyle's TV persona was the very apotheosis of common sense!). For in an earlier volume co-authored with Wickramsinghe (*Evolution from Space*) he had concluded that the vast improbability of life by spontaneous generation (which the two authors calculated as ten to the $40,00^{th}$ power – rather like tossing a coin and it coming up heads 6000 times in a row) meant that

the scientific facts throw out Darwin but leave William Paley, a figure of fun to the scientific community for more than a century, still in the tournament with a chance of being the ultimate winner.[35]

Paley the winner? Unthinkable! (Hoyle seems to imply.) It seems that any association with Paley's faith in a Genesis-based, theistic origin for life on earth was perceived to be something of a kiss of death to an eminent scientist. In order to avoid that dread association, Hoyle was even willing to risk reputational damage by lending his prestigious name to a theory arguably far more outlandish than the one he was attempting to suppress.

In retrospect we can see that there was far more at stake in the Miller-Urey experiment than many may have realised at the time. Its implicit promise was that it would extend Darwin's narrative time-line back into the pre-organic formation of the first cell of life, and so

establish the fundamental point of departure for subsequent selection mechanisms to go to work. The failure of this and later, similar experiments has removed the very foundation stone of natural selection and its logical *sine qua non*. The ultimate problem of how the process of cumulative selection will have begun its operations remains unresolved because the basic problem of the means by which evolution got its 'raw material' remains unresolved. From the start, Darwin's theory of natural selection appears bereft of any logical foundation even as regards its putative starting point.

NOTES

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3. Adrian Desmond and James Moore, *Darwin*, p. 31.
4. *The Voyage of Charles Darwin*, p.22.
5. *Natural Theology. Evidence of the Existence of the Deity, collected from the Appearances of Nature*, edited by Matthew D. Eddy and David Knight (Oxford: OUP, 2008).
6. William Paley, *Natural Theology*, pp.7-8.
7. *Science and Spirituality. The Volatile Connection* (London: Routledge, 2004), p.60.
8. Douglas Dewar, *Difficulties of the Evolution Theory* (London: Edward Arnold, 1931); *More Difficulties of the Evolution Theory* (London: Thynne and Co., 1938).

9. Alvar Ellegård, *Darwin and the General Reader. The Reception of Darwin's Theory of Evolution in the British Periodical Press* 1859-72 (Gothenburg: Elanders, 1958).
10. Muggeridge, *The Earnest Atheist* (London: Eyre and Spottiswood, 1936), p.221.
11. Samuel Butler, *Evolution Old and New* (New York: Jefferson, 2016).
12. Peter Raby, *Samuel Butler. A Biography* (London: Hogarth, 1991), p.169. See also Malcolm Muggeridge, *The Earnest Atheist*, p.218 for Butler's pantheism.
13. William Hale White, *The Autobiography of Mark Rutherford*, edited by William S. Peterson (Oxford: OUP, 1990). Rutherford, we are told, rekindled his dwindling faith after reading the Lyrical Ballads.
14. Misia Landau, *Narratives of Human Evolution* (Yale: Yale UP, 1993).
15. Neal Gillespie, *Charles Darwin and the Problem of Creation*, p.105.
16. Stephen Greenblatt, *The Swerve. How the Renaissance Began* (London; Vintage, 2012). For the text of Lucretius in English translation see *The Nature of Things*, translated by A. E. Stallings with Introduction by Richard Jenkyns (London: Penguin, 2012).
17. Epicurus, *The Art of Happiness*, translated with Introduction by George K Strodach (London: Penguin, 2012), Introduction, p.7.
18. David Hume, *Dialogues and Natural History of Religion*, edited by J. C. A. Gaskin (Oxford: OUP, 2008).
19. Cited by Patricia Fara, *Erasmus Darwin, Sex, Science and Serendipity* (Oxford: Oxford UP, 2012), p.58.
20. A very comprehensive conspectus containing information on all Darwin's predecessors, ancient and modern, is found in the older work by Philp G. Fothergill, *Historical Aspects of Organic Evolution* (London: Hollis and Carter, 1952).

21. Cited by Janet Browne, *Charles Darwin, Voyaging* (London: Pimlico, 2003), p.39.
22. James A Secord, *Victorian Sensation. The Extraordinary Publication, Reception and Secret Authorship of Vestiges of the Natural History of Creation* (Chicago: Chicago UP, 2000).
23. Jacques Barzun, *Darwin, Marx, Freud. Critique of a Heritage*, revised second edition (New York: Doubleday Anchor, 1958), p.11.
24. Dawkins, *The Blind Watchmaker* (London: Penguin, 1986) p.43.
25. Matti Leisola and Jonathan Witt, *Heretic. One Scientist's Journey from Darwin to Design* (Seattle: Discovery Institute, 2018), p.23.
26. Inside human cells coded messages in the DNA are translated by RNA into working molecules of protein, which is responsible for life's functions.
27. See Mary Shelley, *Frankenstein or the Modern Prometheus*, 2nd edition, edited by Maurice Hindle (London: Penguin, 2003), Introduction, pp.xxiv-xxv.
28. Browne, *Charles Darwin, Voyaging* (London: Pimlico, 2003), p.39.
29. See Michael Denton, *Nature's Destiny, How the Laws of Biology reveal Purpose in the Universe* (New York: Free Press, 1998), p.293.
30. Dawkins, *Blind Watchmaker*, p.148.
31. James Tour, "We're still clueless about the origin of life" in *The Mystery of Life's Origin. The Continuing Controversy*, new expanded edition, edited by Charles B. Thaxton and others (Seattle: Discovery Institute, 2020), pp.323-357.
32. See Daniel Dennett, *Darwin's Dangerous Idea. Evolution and the Meanings of Life* (London: Allen Lane, 1995), p. 314.

33. Denton, *Evolution. A Theory in Crisis* (Bethesda, Maryland: Adler and Adler, 1986), p.271.
34. *The Intelligent Universe* (London: Michael Joseph, 1983), p.23.
35. Thomas Woodward, *Doubts about Darwin. A History of Intelligent Design* (Grand Rapids: Baker, 2003), p.43.

THREE

THE CHALLENGE OF INTELLIGENT DESIGN

If the world's finest minds can unravel only with difficulty the deeper workings of nature, how could it be supposed that those workings are merely a mindless accident, a product of blind chance? (Paul Davies)[1]

I would like to defend the untutored reaction of incredulity to the reductionist neo-Darwinian account of the origin and evolution of life. It is prima facie highly implausible that life as we know it is the result of a sequence of physical accidents together with the mechanism of natural selection [...] *I find this view antecedently unbelievable – a heroic triumph of ideological theory over common sense. The empirical evidence can be interpreted to accommodate different comprehensive theories but in this case the cost in conceptual and probabilistic contortions is prohibitive* (Thomas Nagel)[2]

Paul Davies's admirably direct question cited above poses an uncompromising challenge to sundry received ideas in the evolution field. In its entirely proper deference to the niceties of academic debate, however, his question still contains an element of diplomatic understatement. For it is not just that nature's workings

can be unravelled "only with difficulty": in very many, perhaps the majority of cases, they cannot be unravelled at all. Unlike cosmologists who confess (often with cheerful and unprompted candour) to not having a clue about dark energy, dark matter, black holes and other cosmic arcana, and that anyway only 4% of the universe is even available to be observed and studied by them, Darwin and many later biologists have tended to paper over the cracks of their own lack of knowledge. This lack of transparency has inevitably led to a number of scientific objections, many arising in the later decades of the nineteenth century, others in the more modern period.

The claim that Darwinism gives us the key to unlock what was for centuries termed 'the mystery of mysteries'– life on earth – was most signally challenged in the immediate aftermath of the publication of his *Origin*. A brief reprise of older criticisms will I hope prove useful in the interests of historical contextualisation, foreshadowing as they do a number of objections to Darwinism which have resurfaced within the last half century. These older criticisms are especially useful since they date to a period when Darwin had not yet been enthroned in popular consciousness as The Sage of Down House (his country home). Earlier reviewers were less minded to pull their punches.

Near-contemporary reactions to the publication of the *Origin* were in the main negative. Søren Løvtrup goes so far as to observe that "[Darwin's] theory was rejected by almost all who had the power to judge",[3] and a curious aspect of the work's immediate reception is that two allies of Darwin, Thomas Huxley and Joseph Hooker, eminent botanists both, were loud in their support of Darwin but remained unpersuaded by his special theory of natural selection. In particular, their consensus was that since

nobody had ever seen one species change into another [...] *Darwin's was not a proper inductive generalisation; and no definite outcome could be deduced from his law and tested by experiment, as the existence of the planet Neptune had recently been predicted from the Newtonian theory of gravity.*[4]

Huxley also had a problem with the very purposelessness claimed for the selection process. How was it possible for a process knowing nothing of the final end of things to fulfil its winnowing role when the only test *is* that end? He also attempted to reintroduce what Darwin regarded as the 't' word (teleology) into the equation by suggesting that natural selection *did* have a purpose, which consisted in the well-being and progress of the group or species to which the individual belonged even if not necessarily of the individual him/herself.

Huxley, however, consented to becoming a pseudo- Darwinian (in Peter Bowler's term) out of philosophic necessity: he was a fervent materialist lending his support to any movement subserving his non-theist cause, viewing Darwin's work as "a veritable Whitworth gun" for exploding religious dogma. For if one has a conception of nature and the earth as a closed, autonomous system unsupervised by a divinity or any other force, then *some* wholly naturalistic process of species development was an ideological and indeed logical necessity. Whether Darwin had hit on the *right* natural solution might well have been a secondary consideration to Huxley, given his ideological agenda.

A second curious factor about the very early reception of the *Origin* was the reaction of the reader chosen by Darwin's publishing house, Whitwell Elwin. That reaction has since become the occasion of much mirth since he advised rejection of the manuscript, recommending that the author should confine himself to pigeons: "all the rest should be abandoned." Elwin (respected editor of *The Quarterly Review*) found it "a wild and foolish piece of imagination" vitiated by its over-speculative tendencies: "At every page I was tantalized by the absence of proofs [...] It is to ask the jury for a verdict without putting the witnesses in the box."[5]

Coming now to the mainstream reviewers, the leading philosophers John Herschel, William Whewell

and John Stuart Mill also thought the work massively conjectural with few findings that could be claimed as proofs. (Darwin was particularly stung when it got back to him that Herschel had dubbed natural selection "the law of higgeldy-piggeldy".) The novelist George Eliot was lukewarm, pointing out that the volume was "sadly lacking in illustrative facts". Harvard professor Asa Gray and geologist Charles Lyell made the plea for some sign of teleology, rather than mere chance, in evolutionary theory, and were supported by St. John Mivart. Mivart reasoned that, just as there is a principle internal to an organism which determines its embryological development, so must there be a similar, *internal* principle to determine the evolution of a species as a whole. Mivart here seems to echo an originally Aristotelian idea of immanent teleology, a doctrine which became influential for European posterity in opposition to the randomness of the Epicurean and Lucretian philosophies which fell into neglect in Europe until the eighteenth century, as observed above.

Mivart's idea is echoed in August Weismann's review of 1868. The German scientist pointed out that organisms have a fixed direction of development (*Entwicklungsrichtung*) so that whilst there could be a wide margin of *superficial* variations in all directions, such variations would never be able to advance to the status of a new species. This was in line with the ideas of the foremost anatomist of the first half of the nineteenth

century, Richard Owen, who also believed that the primary evolutionary force was internal to the organism, rather than occurring by natural selection. Like the earlier French naturalist, Cuvier, Owen had assigned humans (in contradistinction to apes) to the separate taxonomic group of *archencephala* (of superior brain): a rather crucial distinction. In the same year Moritz Wagner cautioned that speciation *in situ* was inconceivable since any differences that emerged would become genetically absorbed and levelled out over succeeding breeding generations with the inevitable return to the *status quo ante*, that is, a reversion to the genetic mean. Any chance of lasting variation could therefore only be envisioned on the basis of genetic isolation taking the form of a migration away from the original animal or tribal grouping.

Mivart was and remained Darwin's principal opponent, developing his Darwinian critique into a full-scale monograph a decade after the *Origin* entitled *The Genesis of Species*. In that volume he itemised his objections, the chief of which included the claim that "natural selection is incompetent to account for the incipient structures"[6] (an objection later taken up by the modern Intelligent Design group of scientists, as will be observed below). Mivart also advanced the idea that specific differences could be developed suddenly instead of gradually, this being the idea of 'saltations' or sudden spurts, against which Darwin set his face. There were

also definite limits to the variability of species, he continued, in opposition to Darwin's idea of well-nigh limitless transmutations over time, including the cross-over to new species.

Mivart also pointed out that "certain fossil transitional forms are absent which might have been expected to be present". This latter point represented a major stumbling block then as it does now to the acceptance of Darwin's theory, and it was based on good evidence which Darwin had access to. In the year before the publication of Darwin's *Origin*, Edward Hitchcock in his volume *The Religion of Geology* had found that the fossil record did not show a gradual development of life forms via intermediaries but rather a discontinuous start-and-stop process involving just those kinds of 'saltations' that Darwin ruled out of account. Hitchcock's conclusion that these discontinuities in the fossil record were an indication of repeated divine interventions was of course precisely the doctrine which Darwin was determined to oppose, even, it appears, at the cost of ignoring important evidence if it undermined his own position.

Separate mention must also be made of that critic whom Darwin respected but feared almost as much as the pugnacious Mivart: the Scots engineering professor, Fleeming Jenkin, a man of limitless ingenuity who had issued more than a score of patents for his inventions. In his 1867 review of Darwin's work[7] Jenkin did not doubt

the possibility of minor changes like the ones Darwin had studied in the avian population of the Galapagos Islands. Slight improvements "making a hare a better hare or a weasel a better weasel" were eminently possible: natural selection in that limited sense was uncontroversial, he conceded, but this did not "imply an admission that it can create new organs, and so originate species". There was a limit to the amount of variation that could be anticipated, and the important factor of interspecific (hybrid) sterility would prevent the possibility of certain evolutions. As to Darwin's invocation of time itself as the factor which could account for the snail's-pace progress of speciation over millennia, Jenkin replied with refreshing briskness, "Why should we concede that a simple extension of time will reverse the rule?" Jenkin's point here is a welcome one in its attempt to scotch the misleading canard beloved of Darwin and his later apologists that time itself could in any sense play a supporting role in driving the process of natural selection, a subject which will be revisited here in later pages.

Towards the end of the century, Darwinian theories were rejected by the eminent scientist who introduced Mendelian genetics to British science, F. W. Bateson, who concluded:

The transformation of masses of population by imperceptible steps guided by selection is, as most of us

now see, so inapplicable to the facts [...] *that we can only marvel both at the want of penetration displayed by the advocates of such a proposition and at the forensic skill by which it was made to appear acceptable even for a time.*[8]

In his exhaustive survey of biological research to 1907, Vernon L. Kellogg concluded that Darwinism was "cast down" as a credible theory,[9] and in the early twentieth century there was a real possibility that it could have been eclipsed altogether had it not been rescued, as it were, by attempts to update it by synthesizing Darwinism with the science of genetics – which Darwin knew nothing of despite a partial overlap of the lives of Darwin and Gregor Mendel, the Moravian monk who established the modern understanding of genetics.

The first three decades of the twentieth century were a low point in Darwin's reputation. In 1907, the same year in which Kellogg predicted the demise of Darwinism, an anti-Darwinian theory of biological origins was advanced by French philosopher Henri Bergson in his work *Creative Evolution* (1907).[10] The level of that theory's acceptance was indicated by the fact its the author was awarded the Nobel Prize. Bergson's theory postulated that all life results, not from mechanistic forces as Darwinism taught, but from a vital impulse that caused evolution, the *élan vital,* a non-material force guiding evolution in specific directions.

The *élan vital*, Bergson explained, is a basic force like gravity or electromagnetism and, like them and many other physical phenomena, its origin cannot be explained.

Bergson also concluded that, due to what later writers would call irreducible complexity, at every stage of any given animal's evolution, all the parts of an animal and of its complex organs must have varied contemporaneously so that effective functioning was preserved (the idea first advanced by Cuvier). It was implausible to suppose, as did Darwin, that such variations could have been randomly organised, for 'random organisation' would be a contradiction in terms. Bergson's influence on French science continued into the latter part of the century when Pierre-Paul Grassé's *L'Evolution du Vivant* (1973) came out in favour of a more directed form of evolution than that allowed for in the Anglo-Saxon and German traditions. Its author candidly conceded that the ultimate mystery of evolution remained unsolved, graciously "ceding the floor to metaphysics" for the final word on the matter.

The late twentieth century saw the beginning of a sequence of critiques which are associated with what is collectively referred to as the modern Intelligent Design movement (although in point of fact it was no coordinated movement). A straw in the wind was observable in 2001 when, after an American Public Broadcasting Service TV programme was transmitted

featuring a Darwinian gloss on a natural history topic, a number of reputable scientists took out a one-page advert in a national newspaper under the pointed title of 'A Scientific Dissent from Darwinism'. The scientist most frequently credited with having raised their collective consciousness about this issue, Michael Denton, had concluded in his book, *Evolution. A Theory in Crisis* (1985), that the scarcely conceivable complexity of life could hardly have evolved from the contingent dynamics of natural selection: to make that claim would be "an affront to reason" – tantamount to believing in miracles. To be sure, *microevolution*, concerning only small variations to existing structures, is feasible, he conceded, but larger changes, *macroevolutions*, clearly go far beyond minor tweaking because, for systemic changes to occur in an organism, the simultaneous generation of complex biological motors and accompanying genetic 'databases' would be required.

For Denton as for other non-Darwinian scientists such as the Americans Michael Behe, William Dembski and others, the complexity of such organs as the eye and human brain provide unarguable counter-indications to any inference that the blunt tool of natural selection could have been the mechanism of their making. Given the interdependent nature of these organs' structuring and their synergetic coordination, their component parts could hardly have achieved their exquisitely harmonised form in an incremental, purely additive way (since

natural selection is of course held to advance randomly by small modifications accumulating over deep time). On the contrary, such organs show up empirical markers for design, a factor which had clearly worried Darwin when he wrote: "If it could be demonstrated that any complex organism existed which could not have possibly have been formed by numerous, successive, slight modifications, my theory would absolutely break down". This latter doubt explains why he remained troubled for the remainder of his life by the eye's apparent 'precision-engineering':

To suppose that the eye with all its inimitable contrivances for adjusting the focus to different distances, for admitting different amounts of light, and for the correction of spherical and chromatic aberration, could have been formed by natural selection, seems, I freely confess, absurd in the highest degree.[11]

Even if the eye could have developed by incremental stages, the question arises as to what survival value an inchoate eye could have had. It has been computed that the development of a fish eye could take 364,000 generations, which might appear to be a rather long time to wait if you are a fish wanting to spot and evade predators, as A.N. Wilson drily observed.[12]

Denton's detailed and firmly argued critique did not come entirely out of the blue. He was in fact tapping

into a more general dissatisfaction with the neo-Darwinian accommodation which can be traced back to the sixties and seventies of the last century, when Nobel Prize winner Sir Pete Medawar expressed misgivings about reductionist approaches to complex biological problems. The novelist and scholar Arthur Koestler, who very effectively straddled the 'two cultures' of Sciences and Humanities described by the scientist-novelist C. P. Snow in 1959, argued in the 1960s that natural selection was far too simplistic an explanation to account for many of nature's complexities. For him the extreme unpredictability of the posited natural selection process amounted to little more than a game of blind man's buff. Given the number of 'interlocking parts' which would have to come together in a perfectly synchronised way, he concluded that "the doctrine of their coming together due to blind coincidence is an affront not only to commonsense but to the basic principles of scientific explanation."[13]

Scholars from within the Humanities proper objected to "neuro-evolutionary thought creating new biology-based disciplines encroaching on the intellectual territory of the humanities",[14] and David Holbrook in his volume *Evolution and the Humanities* (1987) devoted one whole chapter specifically to 'Rescuing the Humanities from Darwinism'.[15] For English Literature academic Holbrook, a "toxic and essentially nihilistic metaphysic" which reduces life to meaninglessness was

not, he thought, the best basis for reading, viewing or listening to the crowning cultural achievements of mankind! Even world biological authority Stephen J. Gould did not see his scientific specialism as the be-all and end-all. As Kim Sterelny put it: "Gould does not think science is complete. The humanities, history and even religion offer insight into the realm of value –of how we ought to live – independent of any possible scientific discovery."[16]

The dispute about the applicability or otherwise of what Raymond Tallis has termed "full-on biologism" arose for the Design scientists in particularly acute form with reference to human beings' unique cognitive/linguistic competence. Even from the start, Victorian readers had baulked at Darwin's assumption in his *Descent* that humanity's complex linguistic capacities had 'evolved' from some earlier form of apelike communication. The bare physiology of ape and human vocal tracts is very different, the human variant longer and differently configured[17] to facilitate those sequences of extended vocalisations which we call language. The ape, by contrast, is physiologically constrained (like a human baby) to be able to produce only a very limited range of sounds.

And even if it is perfectly possible to speculate that the œsophageal physiology of the ape may have evolved in the direction of its human equivalent, this does not explain how the rapid mental processing on

which articulate speech depends kept pace with that process. Synchronisation of those two processes would of course point not to random evolution but to coordination and therefore *design*. How could the facility of speech, which depends on the interdependent agency of brain, mouth, lungs and tongue have developed by any process of natural selection which would have to have ponderously reconfigured a vast suite of genetic changes in the genome and a corresponding set of neuronal changes in the brain?

Opposition to the Darwinian view came from two legendary linguistics specialists: Professor Friedrich Max Müller, who in the nineteenth century was a world expert in the then very much 'trending' field of Indo-European philology in Oxford; and the American linguistic science expert Noam Chomsky, famed both in the linguistics sphere and for his activism in the political arena from the middle of the twentieth century onwards. In a series of lectures at the Royal Institution in 1860, Müller, although he expressed sympathy for some of Darwin's ideas, claimed that the language of primitive humans could not have developed from animal sounds, as Darwin supposed. He put forward the idea that words were related to mental concepts in a non-onomatopoeic way. It was, he claimed, impossible for language to arise from the vocalisations of animals because animals manifestly had not developed any understanding of concepts.

Noam Chomsky argued the case for an inbuilt universal grammar which he thought to be embedded in the neuronal circuitry of the human brain. He was convinced that language competency was largely innate, not something that had to be acquired after birth. Language was fixed in the form of inbuilt specified rules and a child will adapt appropriately to the relevant linguistic cues as whether it is English (s)he must speak, or Chinese, or any other tongue. This is why we all pick up our first language with such ease, because there is a form of (as yet unidentified) language 'organ'. Finally, he concluded, the human language facility was not an adaptation but a 'mystery' (Chomskean code for a puzzle unlikely ever to be solved). Chomsky's contra-Darwinian position was encapsulated in his statement that people were welcome to say that language evolved if they wished, "so long as they realise that there is no substance for this assertion, that it amounts to nothing more than a belief".

Müller and Chomsky were not the only 'celebrity' dissenters. The first, astoundingly, had been none other than the co-discoverer of the natural selection theory, Alfred Russel Wallace himself, whose later defection from the purer Darwinian faith was to blindside Darwin. In his earlier writings, Wallace's description of natural selection stays in lockstep with his peer's without the slightest interpolation of anything smacking of metaphysics. In fact, for many years

Wallace was thought to be an even stronger advocate for natural selection than Darwin himself, frequently arguing that all the rich complexity of life must have evolved naturally without benefit of intelligent guidance. However, he parted company with Darwin eventually on the subject of the human mind, citing his inability to comprehend how unconscious processes could produce consciousness. He came to think that human self-awareness was of such a high order of sophistication and so unlike anything else in nature having arisen by natural causes, that natural selection was powerless to account for it. He could not bring himself to believe "that the mere addition of one, two, or a thousand other material elements to form a more complex molecule, could in any way tend to produce a self-conscious existence".[18]

Not surprisingly, the journal *Nature* upbraided Wallace for his illogical dualism, concluding scathingly, "to say that our brains were made by God, and our lungs by natural selection, is to really exclude the Creator from half His creation, and natural science from half of nature."[19] In a similar vein Darwin roundly arraigned Wallace for writing "like a metamorphosed (in retrograde direction) naturalist, and you the author of the best paper that ever appeared in Anthropological Review!" Darwin was particularly scandalised to realise that Wallace had been taken in by the contemporary craze for séances,[20] a weakness he and most people to this day would find as inexplicable as Arthur Conan

Doyle's being taken in by fake photographs of the so-called Cottingham Fairies a few decades later.

What Darwin construed as the infirmity of an otherwise noble mind (although it must be said Wallace's mind remained sharp and 'research active' even into his late eighties) explained at a stroke for him the genesis of his colleague's defection. For in the course of communicating with deceased persons one was (ostensibly) communicating with *disembodied* entities – which are of course by definition non-corporeal. This explained much of how adepts such as Wallace came at length to become convinced that mind and body really were discrete entities. It is no wonder that Darwin was dismayed by his colleague's defection. For if human language is thought to fall outside the evolutionary scheme, so does man himself – he clearly can't be half in and half out, his body brought about by natural selection and his brain fashioned by God! To accept that absurdity would spell the certain death-knell for Darwin's theory.

Further sharp criticism of Darwinian tenets has arisen in respect of the brain, the acknowledged jewel-in-the crown of *homo sapiens*, for that subject inevitably brings in its train the intangible, non-material phenomena of consciousness, thought and the subjective self. In the course of the last half-century neuroscience has shown that the human brain is something of such awe-inducing microcomplexity that no hyperbole can do it justice. The hundred billion (yes, billion) neurons in

our brains are all connected to other neurons by small fibres (dendrites) to allow instantaneous communication. There are more than a quadrillion electrical connections or synapses which make it the most complex piece of 'machinery' known to mankind (I use the term machinery for lack of a worthier term: even a main-frame computer would be a vastly belittling comparison). I defy anyone not to rub his or her eyes in wonder when reading Michael Denton's description, reproduced here:

Attempting to visualize a billion neurons, each a tiny nanoscale navigator, preprogrammed with a unique set of maps and the ability to match each map, at a defined and preprogrammed time, with the unique configuration of a series of unique sites in the ever-changing terrain of the developing brain, all homing in, unerring, toward their target, brings us indeed to the very edge of an 'infinity' of adaptive complexity. The unimaginable immensity of 'atomic maps', 'molecular charts', 'nanotimepieces' and other nanodevices used by this eerie infinity of nanorobots which navigate the ocean of the developing human brain, building as far as we can tell the only machine in the cosmos that has genuine understanding, is far greater than that of all the maps, charts and devices used by all the mariners who ever navigated the oceans of earth, far more than even all the stars in our galaxy, more than all the days since the birth of the earth.[21]

Even that fine description evokes only the physiological *mechanisms* of the brain. Notwithstanding science's growing knowledge of the brain's physiological structures, it cannot purport to explain how the firing of literally billions of neurons translates into thought and emotion. Subjective experience, *mind*, appears to occupy some as yet invisible and indeed unvisualisable order of reality inexplicable in terms of its material properties and entirely resistant to human scrutiny. In philosophical parlance, this introduces the issue of 'dualism', the question of whether there can be a physical world (one knowable by scientific observation) plus an additional world of consciousness and self-knowing which resists scientific probing. A dualistic view was espoused by philosopher Sir Karl Popper in the latter part of the twentieth century, whereas orthodox Darwinism tends to regard mankind's self-consciousness as a mere 'epiphenomenon' – meaning an accidental outcome of the mechanical workings of the brain (however that form of words may be glossed!).

For Darwinian dissenters it simply lacks logical coherence to suppose that *sentience*, baffling to the best scientists and thinkers to this day, could have evolved template-less from any purely material matrix. How could the interplay of impersonal forces have all unwittingly been instrumental in the creation of persons? It is not even possible to imagine a theoretical pathway leading to how consciousness could have come about by

natural selection – which is one reason why leading scientists in the field such as Susan Blackmore have found it threatening to the Darwinian paradigm.[22] Scientists often adopt hushed and almost embarrassed tones in referring to consciousness since it represents a major challenge to the materialist schema into which all facets of human life 'should' be able to be fitted. They are loath to acknowledge that the problem does not rest with consciousness but with the Procrustean, one-size-fits-all schema they support. Not surprisingly then, for Denton, the large improbability of intelligent life being formed by forces bereft of all cognitive capacity provides nothing less than a "formal disproof" of the whole Darwinian dogma, dubbed by him "the great cosmogenic myth" of the modern era.

Darwin's main hypothesis concerning the idea of a biological continuum with its ascent-of-man narrative from ape to *homo sapiens* has also been cast into considerable doubt on a whole host of fronts. Empirically, the idea of a cross-over from one species to another appears problematical in view of the practical experience of animal husbandry, where even *selective* breeding has proved unsuccessful in bringing about anything but minor changes. Darwin must also of course have known that sentient beings are not built up of discrete parts on the modular basis of prefabricated sheds. Cuvier had long since established what he termed the Law of Correlation which stated that no part of a

body could change without the whole changing, since all parts of any given body must be in perfect relation to its other parts. Hence for a species to change dramatically there would have to be co-adaptive changes since, in the words of the old ditty, "The hip bone is linked to the thigh bone" and so on and so forth. The simultaneous co-adaptation of numberless body parts, including internal organ modifications and information storing systems to make all the reconfiguring function properly is not easy to imagine. Furthermore, as was noted above, the genetic code possesses an inbuilt fail-safe system to ensure genetic homeostasis and the integrity of the species. All these factors represent counter-indications to the notion of species cross-overs.

Nevertheless, nothing daunted, Darwin sought to support his grand ontological step-change postulate from ape to man by reference to two factors which he thought would have facilitated the transmutation. The first of these was 'deep' time itself, the second a postulated multiplicity of biological intermediaries in an extended chain of metamorphic transmission. Both of these claims are tenuous. It was already observed in the context of the early reception of the *Origin* that the Scots professor, Fleeming Jenkin, had discounted the idea of time itself having the capacity to play some disproportionately grand role in proceedings. The point that Jenkin made in 1867 was more recently reinforced by Hoyle in 1983:

A generation or more ago a profound disservice was done to popular thought by the notion that a horde of monkeys thumping away on typewriters could eventually arrive at the plays of Shakespeare. The idea is wrong, so wrong that one has to wonder how it came to be broadcast so widely. The answer I think is that scientists wanted to believe that anything at all, even the origin of life, could happen by chance, if only chance operated on a big enough time scale.[23]

Notwithstanding such counter-indications, however, one of Darwin's foremost apologists, Richard Dawkins, has more recently made the extraordinary claim that 'given time, or infinite opportunity, anything is possible'[24] – a textbook example of the *ipse dixit* or unsubstantiated assertion. In his book *Not by Chance*, Lee Spetner devoted a whole chapter to explaining how fundamentally wrong that contention is by using sophisticated statistical arguments to show that, as he put it, "Dawkins does not understand probability".[25] I refer interested readers to that chapter directly since I do not feel competent to represent the fine detail of the author's statistical workings, but will reproduce Spetner's précis of his position here:

Dawkins's error is one that evolutionists often make [...]. *They think the earth's age is long enough for anything to have happened. When one deals with events*

having small probabilities and many trials, one should multiply the two numbers to determine the probability. One should not just stand gaping at the long time available for trials, ignore the small probability, and conclude that anything can happen in such a long time. One has to calculate.[26]

Yet however that matter may be finally adjudicated, it is still unimaginable that even an infinite amount of time (or opportunity) could overcome fixed biological constraints. As to the putative slow mode of transformation via transitional forms, the lapse of millions of years places this theory beyond the reach of any possible empirical test and so the idea badly needs at least indirect evidential back-up. Unfortunately for Darwin there is a dearth of fossil evidence to establish the claimed evolutionary 'missing links,' a situation not likely to improve in future time to judge by the sorry state of most fossils found after his day which have tended to be damaged and/or scattered. The ideal of finding a neat sequence of fossils layered over time to permit minute observation of continuities and discontinuities seems unachievable. The unfortunate result is that deciphering the course of human evolution from the fossil record has been likened to trying to work out the plot of *War and Peace* from about a dozen pages torn *at random* from Tolstoy's novel. This has meant in practice that preconceived ideas have often been given

licence to play as much of a role as dispassionate observation in many fossil analyses.

The fossils that *have* been found are few in number. They include the archaeopteryx, thought to be a hybrid, half bird, half reptile; the eohippus, a dog-sized ancestor of the horse thought to have evolved in size over 50 million years, and the well-known Neanderthal man and Cromagnon man remains. There have also been a number of forgeries, the most famous of which was 'Piltdown man', a skull with a man-like brain and an ape-like jaw which was for many years taken to be a vindication of Darwin's claim that there existed intermediaries between ape and man. This idea persisted from the time of its purported discovery in 1912 to the time it was revealed to be a hoax in 1953. Victimless crime it may have been in the financial sense but it led many scholars down a bogus track for four decades.

Whether the Piltdown affair was a 'pure' hoax of the April Fool variety (like the notorious 'surgeon's photograph' of the Loch Ness Monster in the 1930s) or whether the finding of this and other forged fossils had anything to do with perpetrators' desire to provide an illicit 'remedy' for what Darwin termed "the extreme imperfection of the fossil record", must remain moot. None of the persons associated with the excavations at Piltdown in southern England in 1912 were anything but pillars of social responsibility: Charles Dawson, a solicitor, Arthur Keith, a respected anatomist, Arthur

Woodward, Keeper of Geology at the British Museum of Natural History, and Pierre Teilhard de Chardin, priest, amateur naturalist and distinguished proponent of the theory of theistic evolution. It also seems unlikely that ancillary workmen helping in the excavation could have been responsible for a fabrication requiring at least a degree of palaeontological sophistication.

Indeed, there is no definitive 'smoking gun' suggesting that any of those upstanding persons were the perpetrators, and M. Bowden's identification of the Piltdown hoaxer with Teilhard de Chardin must finally remain unprovable.[27] Nevertheless, the affair surrounding this bizarre middle-class crime remains suspect and it has been observed that:

the zeal with which eminent scientists defended it, the facility with which those who did not welcome it managed to accommodate themselves to it, and the way in which the most respected scientific techniques were soberly and painstakingly applied to it, with the apparent result of confirming both the genuineness of the fossils and the truth of evolution, are at the very least suspicious.[28]

Curiously, Darwin himself acknowledged and indeed drew attention to the lack of fossil evidence – he even, as he put it, "had difficulty imagining by what gradations many structures had been perfected" adding:

Why, if species have descended from other species by fine gradations, do we not everywhere see innumerable transitional forms? Why is not all nature in confusion, instead of the species being, as we see them, well defined? [...] *as by this theory innumerable transitional forms must have existed, why do we not find them embedded in countless numbers in the crust of the Earth?*[29]

Yet, as Gertrude Himmelfarb noted (who did more than any other critic to unmask Darwin's rhetorical evasions), Darwin's technique here and elsewhere was "to assume that by acknowledging the difficulty, he had somehow exorcized it",[30] coming up with a faux confession aimed at propitiating critical dissent. Thereafter, misgivings whisked away by rhetorical legerdemain cum disarming self-effacement, he proceeds, in a famously circular argument, to blame the fossil record itself for not providing the evidence he desired (lacing this with the pious hope that future fossil finds would prove him right). His hope that the gaps would be remedied after his day has not, however, been fulfilled to date.

In point of fact, a striking feature of the fossil record is that most new kinds of organism have tended to appear unheralded in the sense that they are not led up to by a sequence of imperceptibly changing forerunners,

such as Darwin believed should be the case. So grave was this anomaly perceived to be by the later decades of the twentieth century (when after more than a century it became clear that the fossil evidence optimistically predicted by Darwin was probably not going to be uncovered) that in 1972 Stephen J. Gould and Niles Eldridge, put forward a theory of 'punctuated equilibria' to account for the gaps – meaning that, *pace* Darwin, there must have been large spurts or saltations in evolution, followed by protracted periods of stasis in which the process is assumed to have become dormant. Only on that understanding could the many punctuations (gaps) in the fossil record be made sense of, for by now Gould was convinced that Darwin's hypothetical intermediaries were "unimaginable".

This was clearly a large blow to Darwin's insistence on a very gradual process of evolution. For Darwin, his theory depended absolutely on an almost imperceptible rate of evolutionary growth. It had to be slow since the co-adapted construction of organisms constrains the extent to which one organ can change without correlated changes in others. Fast changes would not permit that delicate and measured synchronisation to be properly choreographed. Kim Sterelny gave a good example of what might happen in an unfortunate scenario: "Adding a horn to a horse's head might seem to provide it with a useful defensive weapon, but without compensating changes to its skull and neck (to bear the

extra weight) it would be not only useless but detrimental."[31]

Darwin also remained convinced that a faster rate would be prima facie evidence of divine intervention. Perhaps remembering the analogy of Pallas Athene emerging fully formed from the head of Zeus in Greek mythology, he was adamant that, like Zeus, "only God can perform saltations". Hence, had Darwin still been living in the 1970s, he might have concluded that his grand quest to establish a purely naturalistic narrative to account for life on earth had been compromised, if not entirely subverted, by the widespread acceptance of the Gould/Eldridge corrective.

What major fossil evidence we *do* have is that some 540 million years ago there occurred a phenomenon sometimes called the biological Big Bang, officially titled the Cambrian Explosion, which witnessed evidence of a sudden emergence on Earth of about thirty varieties (phyla) of animal species. These included arthropods, modern representatives of which are insects and crabs; echinoderms: starfish and sea urchins, and chordates – modern vertebrates, followed by mammals. No transitional intermediates are to be found from this era, and, furthermore, there is no evidence to show that these species did *not* emerge fully-formed. This is of course yet again opposed to the idea of slow evolution, and the point has been made that Darwin's favoured evolutionary metaphor of a great Tree of Life

arising from a tiny acorn with diverging branches had come dangerously close to being uprooted by the Cambrian Big Bang.

Had Darwin restricted his observations to Galapagos finches, there is no doubt his findings would have been welcomed without demur. It was (as the press reader had pointed out) the extrapolation from his avian studies to the whole living universe which seemed overly conjectural – a saltation which leap-frogged all normal canons of logic, so to speak. His intellectual gamble was essentially that, if all organisms are capable of evolutionary change, might they not all undergo unlimited change, crossing some of the fundamental barriers apparently erected by nature itself and heretofore deemed immutable? He was making nothing less than the staggering claim that the species barrier claimed to be unbridgeable by the biological typologists and practical animal-breeders alike *could* in fact be crossed. There were no longer any impenetrable biological citadels (if he were to believed). Darwin was clearly taking a hammer and chisel to the conception of fixed types espoused by the foremost anatomist of Britain at the time, Richard Owen, who together with other typologists thought that any variation could only ever be slight because it was constrained by the boundaries of each separate type, or species.

Darwin was in all but name sponsoring the idea of phylogenetic revolution, rather than just simple

evolution. It is then not altogether surprising that scientists sceptical of this view have exhibited a trend to go back beyond Darwin to look again at the evidence for older nineteenth-century conceptions, implicitly treating Darwin as an historical aberration. Denton for instance invokes the idea of invariant types espoused by Owen and Cuvier. Animals/humans on this view are discrete phyla/ varieties: body plans are not adaptive and so cannot be explained by cumulative selection, and forms are not 'led up to' by putative ancestral forms. Against the notion of adaptive gradualism, Denton champions the structuralist approach, concluding that the structures or types we see today are ontologically real and distinct components of the world order. Nature is a discontinuum, and the phyla in their present configurations simply 'are': they should be viewed as a-functional primal patterns which have never served any adaptive end.

Whilst more conservative biologists do not accept this analysis, there has nevertheless in the last half century emerged a non-evolutionary mode of biological classification called cladism (clade = type, from the Greek for 'branch'). Cladism does not make the presumption that species were ancestral to each other. Instead, it classifies organisms according to type without regard to any evolutionary assumptions. For a time it was associated in Britain with the name of Dr Colin Patterson of the British Museum in London who in 1981

was reportedly travelling the conference circuit and embarrassing fellow conferees with the acidulous question: "Can you tell me one thing about evolution that is true – any one thing at all?"[32] Something of a brouhaha ensued at the Museum in the early 1980s when cladism was used as a means of classifying exhibits, and the backlash caused the Museum directors to capitulate, resulting in enforced retreats by Museum staff, and the restitution of some more 'appropriate' signage for exhibits in line with Darwinian conceptions.

The incident may seem in retrospect to be of minor significance yet it nevertheless remains a straw in the wind, showing how easily natural selection can divide opinion and that, despite having been around for far more than a century and a half, it is still far from having won universal acceptance. A consideration of Darwin's second major volume, *The Descent of Man*, may provide some further clues to the reasons for that resistance.

Darwin's The Descent of Man

The *Descent of Man*,[33] being a logical pendant to the *Origin of Species* yet published ten years later, puts humanity explicitly at the forefront of investigation where in the *Origin* this had been merely implicit. The decade break gave Darwin the opportunity to take issue with some of the criticisms levelled at him in that

intervening decade, such as the dispute in the 1860s about the origins of language involving the philologist, Max Müller, adverted to above. In taking issue with Müller's contentions in the *Descent of Man*, Darwin tends to talk up the cognitive capacities of the animal world, while at the same time playing down the abilities of humans to a degree most would find questionable. He writes, for instance, of a human infant having approximately the same mental development as a dog:

As everyone knows [sic], *dogs understand many words and sentences. In this respect they are at the same stage of development as infants, between the ages ten and twelve months, who understand many words and short sentences, but cannot yet utter a single word.*[34]

Darwin even traces the religious instinct in mankind to an inchoate stage in the dog, as when, after his master returns home after an absence, the dog's feelings of adoration reawakened are such that it "looks on his master as a god".[35] As Himmelfarb noted, "as [Darwin] reduced language to the grunts and growls of a dog, he now contrived to reduce religion to the lick of a dog's tongue and the wagging of his tail."[36] Darwin even goes so far as to claim that a dog's 'religion' is purer than that of a human, since human religion has been morally corrupted by such aspects as not only trial by ordeal and human sacrifice (an uncontroversial contention) but also

by celibacy and prohibitions on certain foods – which he terms "absurd religious beliefs". In that regard of course Darwin appears in the (to us) unacceptable guise of a Victorian rationalist who neither accepted any Christian expressions of faith differing from the Anglican norm, nor showed any respect for diversity in other faith traditions.

Most I think, would find a dog and an infant to be incommensurable, but, as Moore and Desmond point out, "Darwin tended to humanize nature even as he naturalized mankind."[37] Why this should have been the case is not known although there are clues. In 1827 he had attended a Plinian Society meeting in Edinburgh University where a Mr Grey had attempted to prove that 'the lower animals possess every faculty and propensity of the human mind.'[38] After a visit to London Zoo in 1832, Darwin felt an instinctive affection for what he termed the innocent creatures he viewed there. We also know from his reports from the Beagle that he felt some alienation from his human peers after witnessing the horrors of slavery together with what he termed the base conduct of some of the Fuegian people. Man's inhumanity to man seems to have convinced him that mankind should not "boast of his proud pre-eminence" since man was in moral terms no better than the higher species of ape from which he had evolved.

There is no evidence from Darwin's everyday contacts with people that any settled misanthropy lay

behind his attitude. Himmelfarb put it down to a form of subconscious 'professional deformation' of the zoologist:

The practice of seeking explanations in the lowest common denominator – morality in terms of instinct, human motives in terms of animal impulses, and civilized conduct in terms of primitive customs – was perhaps a professional failing.[39]

Himmelfarb was of course writing in the late 1950s. Those of us who experienced the arrival of so-called 'sociobiology' in the 70s might have a rather different opinion. That era, it will be recalled, saw the publication of E.O. Wilson's *Sociobiology* (1975) and Richard Dawkins's *The Selfish Gene* (1976).

In *The Selfish Gene*, Dawkins famously encouraged people to think of themselves as "robot vehicles" epiphenomenal to their genes, puppets manipulated by their genetic makeup. These ideas which, it has been claimed, "appeal to people who combine cynicism with credulousness",[40] were vigorously opposed at the time by philosophers Mary Midgley and Anthony Flew, who uttered the inconvenient truth that the gene hypothesis was neither true nor even faintly sensible. Both pointed out that it was logically perverse to claim that genes could be "engaged, whether selfishly, or unselfishly, in any

conscious or chosen pursuit of anything".[41] Wilson, meanwhile, was widely criticised for licensing the kind of thinking which would validate racism, eugenics and sexism, even Nazism. However that particular matter may be, some of the responsibility for the worst excesses of 'social Darwinism' with all its discriminatory and misogynist ramifications, must, alas, be placed at the feet of Charles Darwin himself. Himmelfarb writes of Darwin's "failures of logic and crudities of imagination" and "painfully naïve' forms of analysis and exposition",[42] which are precisely the simplistic and reductionist tendencies associated with sociobiology (later rebranded for tactical reasons as 'evolutionary psychology').

Such weaknesses are particularly in evidence in the way Darwin treats the subject of women, whom he views essentially as less perfectly 'evolved' versions of men. According to the Darwinian narrative (which was rightly disputed even at the time by a number of professional male colleagues in their discussions with Darwin), men's superiority was to be accounted for by the trials and tribulations they had successfully survived in 'winning' females. This gave men an immense reservoir of "cunning, drive and dominance". One suspects that the author's own anthropocentric projections might have acted as midwife to that supposition: did Darwin seriously believe that ancient man dragged off his mate by the hair? Were all sexual

relations based on *rape*? As philosopher David Stove and others have pointed out, no mere slugging match or primordial *bellum omnium contra omnes* could have contributed to the survival of *any* society, however primitive.

This issue had in fact already been addressed by the Russian scientist, Peter Kropotkin, in 1902, in his aptly titled work, *Mutual Aid. A Factor of Evolution*. His observations of harsh Siberian peasant life had revealed few signs of ruthless competition between group members. On the contrary, in the challenging conditions of life in that region of Russia at the time there was a premium on group members helping each other in order to preserve group cohesion and survival.[43] Kropotkin expressed open dissent from Thomas Huxley's unsubstantiated fantasy of primitive life having been little better than a gladiatorial combat, and pointed out that Darwin in his *Origin* had provided no shred of evidence for this speculation (not surprisingly perhaps: the idea was lifted from Malthus!). Modern fieldwork studies have supported Kropotkin's finding that those animals/humans which acquire habits of mutual aid are in truth the fittest to survive.[44] Cooperation rather than competition must always have played the greater role, something which even E.O. Wilson was latterly ready to concede in a rather late Damascene conversion.

When Darwin makes the attempt to explain the crucial point of his volume, mankind's supposed descent

from the apes, he speculates somewhat vaguely on the question of where we as a species got our superior brains from:

The mental powers of some earlier progenitor of man [sic] *must have been* [sic] *more highly developed than in any existing ape, before even the most imperfect form of speech could have come into use; but we may confidently believe* [sic] *that the continued use and advancement of this power would have reacted on the mind itself, by enabling and encouraging it to carry on long trains of thought.*[45]

The passage has the disconcerting tone of a just-so story. How, one might legitimately ask, did one ape 'happen' to get its superior cognitive capacities? What was the *vera causa* of its brainiess? And how did this cognitive superiority trigger correlated changes in the brain? In the light of present-day scientific advances these seem like shallow assertions inadequate to account for what we know about those labyrinthine co-adaptive changes necessary for the process he describes to function effectively. On another point, this passage and many others like it would be a 'gift' to linguistic specialists in discourse analysis or those whose speciality is in the deconstruction of advertising propaganda. His reiteration here and elsewhere of the phrase "we may confidently believe" veils the tenuous

truth-value of what he proposes, which is finally little better than a guess. This mode of assertion is uncomfortably reminiscent of the wearisomely repeated phrase of ex-PR man turned Prime Minister of Great Britain, David Cameron's "Let us be clear" – which you just *knew* was going to be the rhetorical prelude to his making a partisan point vulnerable to all those objections he was trying to head off.

In another passage Darwin seeks to persuade us that the eye was not *designed* but somehow fell into place as the result of myriad chance selections over time. I give it here *in extenso* because the rhetorical structuring of the writing is as important as the scant evidence advanced – perhaps more so:

That many and serious objections may be advanced against the theory of descent with modification, I do not deny. I have endeavoured to give them their full force. Nothing at first can appear more difficult to believe than that the more complex organs and instincts should have been perfected, not by means superior to, though analogous with, human reason, but by the accumulation of innumerable slight variations, each good for the individual possessor. Nevertheless, this difficulty, though appearing to our imagination insuperably great, cannot be considered real [sic] *if we admit the following propositions, namely, – that gradations in the perfection of any organ or instinct which we may consider, either do now exist or could have existed, each good of its kind, – that all organs are, in ever so slight degree, variable, –*

and, lastly, that there is a struggle for existence leading to the preservation of each profitable deviation of structure or instinct. The truth of these propositions cannot, I think, be disputed [sic]. [46]

What has Darwin said there? According to my reading he insinuates that, even though you or I might find the idea of almost unimaginably complex structures like the eye coming about by slight and undirected variations over time unbelievable, this is all in our imaginations. He then points to three propositions *whose truth we may very well doubt* as if they were self-evidently true and as a (hoped for) confirmation of his point, all in the hope that we will come round to his way of thinking! I for one feel very much imposed upon by the insinuation that my instincts are somehow faulty and I bristle at the not very subtle attempt to bounce me into assent, and would be surprised if this were not the reaction of other readers too.

Once the vulnerability of Darwin's arguments is shown in one instance, the rest of his 'story' inevitably seems more questionable – rather like when, in criminal cases, if suspects are caught out in one lie, their credibility falls through the floor and the whole testimony falls like a pack of cards. To give one or two more examples: Darwin was never able to give a straight answer to those persons who objected to his explanation of why giraffes had long necks. If this were such a selective advantage, why did other animals not evolve

long necks? In fact, why were not all species evolving in all different directions, ostriches acquiring the useful faculty of flying, other terrestrial animals of swimming, and so on? Such objections were thoroughly, and indeed devastatingly, analysed by Himmelfarb, but she was not the only critic who had difficulties with Darwin's apparent make-it-up-as you-go along speculations. Eminent Victorian botanist F. W. Bateson, who was instrumental in introducing the new science of Mendelian genetics to the Britain at the very beginning of the twentieth century, had objected that the vagueness of Darwin's description of natural selection as occurring by an 'insensible and imperceptible process' of variation gave us no clue as to what the precise operative mechanism might consist in. More than a century after Bateson that mechanism is no clearer, as Neil Broom pointed out:

Explanations in biology are often couched in terms of things having 'evolved' from simpler systems, thereby giving the impression that no deeper explanation is required. But this kind of talk has no more explanatory power than is contained in the statement, 'the modern computer evolved from the Chinese abacus'. It might be historically true but it tells us absolutely nothing about the crucial role of human creativity and ingenuity in this technological evolution.[47]

None of the above inspires confidence in the main contention of the *Descent* volume that humankind is descended from apes. Having surveyed the evidence, I find myself, after decades of unexamined acquiescence, becoming highly sceptical, and for the same reason that caused Wallace's famous "apostasy from his own theory" more than a century ago (but in my case minus the séance/spiritualism dimension!). *Of course* there are innumerable physiological similarities between ape and man but are these enough to account for the vast *cognitive* disparities between the two species? If anything can be thought to represent a true 'saltation' it is surely the vast mental chasm that any evolutionary process would have had to cross in order to bridge that gap.[48]

In 1894 Bateson stated that Darwin had shown the possibility of his theory (for which of course no evidence is needed), but not its *probability* (for which evidence would be very much required). The fact that so much of the theory is not evidence-based has bequeathed to future adherents of his ideas a very difficult legacy. In fact, some of those supporters have found themselves batting on such a sticky wicket that they have had to resort to the most eye-watering logical contortions to prop up what Himmelfarb had by 1959 concluded was a radically defective theory. Richard Dawkins for instance, the most indefatigable expositor of the Darwinian legacy, has at various points in his voluminous

publications attempted to cajole us into believing propositions of quite staggering improbability. *Climbing Mount Improbable* was the bluffing title of just one of these volumes, in which he seeks to persuade us that what *we* see as being improbable is not *really* so given natural selection's circuitous route to its summit over cosmic swathes of time. In his equally combatively titled *The Blind Watchmaker*,[49] he is obliged to fall back on a similar repertoire of persuasion techniques as that once employed by Darwin himself (such as logical sleights of hand, *pro domo* modes of presentation of evidence, manipulative reasoning, special pleading et al.) in the attempt to coax us into believing many things against which logic and common sense scream out in protest.

Like Darwin before him, then, Dawkins has to make the attempt to persuade us to abjure our innate instincts of common sense (i.e. the kind of 'smell test' scenarios dealt with by Malcolm Gladwell in his bestseller, *Blink*, which preserve us from so many mistakes in the course of our daily lives). He challenges us to rise above our "decade-bound imaginations" in order to understand the true dimensions, and therefore creative and transmutational possibilities (in his view) of geological time. Evolution, he explains in an urbanely reasonable-seeming manner, has equipped our brains to assess probability only in terms of three score years and ten. We are therefore encouraged to believe that our 'difficulty' in comprehending the whole microbes-to-

monkeys-to-man postulate lies with the huge timescale involved in having effected these metamorphoses:

Evolution has equipped our brains with a subjective consciousness of risk and improbability suitable for creatures with a lifetime of less than one century. Our ancestors have always needed to take decisions involving risks and probabilities, and natural selection has therefore equipped our brains to assess risks and against the background of the short lifetime we can expect.[50]

As Neil Broom has justly observed, at such moments "megatime becomes the instrument of creative change. It is used as a kind of magic wand, waved at appropriate points in the argument in order to accomplish quite remarkable feats of materialistic magic".[51] The argument is often batted back to dissidents like Broom with the *ad hominem* counter-claim that they are using the so-called Argument from Incredulity – a mocking term coined to imply that dissenters should gainsay the cardinal virtue of critical rationality and make the ascent to a supposedly higher plateau of insight. However, as Nagel notes, "I believe that the defenders of intelligent design deserve our gratitude for challenging a scientific world view that owes some of the passion displayed by its adherents to the fact that is thought to liberate us from religion." [52] It is no mere

coincidence that Dawkins, among his numerous other books, is also the author of *The God Delusion*.

NOTES

1. Paul Davies, *Superforce. The Search for a Grand Unified Theory of Nature* (New York: Simon and Schuster, 1984), pp.235-6.
2. Thomas Nagel, *Mind and Cosmos. Why the Materialist Neo-Darwinian Conception of Nature is almost certainly False* (Oxford: OUP, 2012) pp.6 and 12.
3. Søren Løvtrup, *Darwinism. The Refutation of a Myth* (London: Croom Helm, 1987), p.422.
4. David Knight, *Science and Spirituality*, p. 142.
5. See Janet Browne, *Charles Darwin, Voyaging* (London: Pimlico, 2003), pp.75-6.
6. Mivart, *On the Genesis of Species* (New York: Appleton, 1871), pp.35-75 (chapter on Incipient Structures). The question revolved around what use partially formed limbs or organs could be.
7. An invaluable collection of early reviews is to be found in David L, Hull, *Darwin and his Critics. The Reception of Darwin's Theory of Evolution by the Scientific Community* (Chicago: Chicago UP, 1973). Jenkin's review is reprinted on pp.302-50.
8. Cited by Gertrude Himmelfarb, *Darwin and the Darwinian Revolution*, p.368.
9. Vernon M. Kellogg, *Darwinism To-Day. A discussion of present-day scientific criticism of the Darwinian Selection*

theories together with a brief account of the principal other proposed auxiliary and alternative theories of species-forming (New York: Henry Holt, 1907).

10. Henri Bergson, *Creative Evolution*, translated by Arthur Mitchell (New York: Digireads Publishing, 2011).

11. His concern persisted since he repeated the same doubt in a letter to the American biologist Asa Gray in 1861.

12. Wilson, *Charles Darwin. Victorian Mythmaker*, p.254.

13. *The Ghost in the Machine* (London: Hutchinson, 1967), p.129.

14. Raymond Tallis, *Aping Mankind. Neuromania, Darwinitis and the Misrepresentation of Humanity* (Durham: Acumen, 2011), p.8.

15. Holbrook, *Evolution and the Humanities* (Aldershot: Gower, 1987), pp.192-200.

16. Sterelny, *Dawkins vs. Gould. Survival of the Fittest,* p.14.

17. R.L Trask, *Language,* second edition (London: Routledge, 1995), pp.18-19 and figures 1.3 and 1.4 for the physiological structures.

18. *The Supernatural Philosopher. Alfred Russel Wallace on Miracles and Scepticism,* ed. David C. Lane (Walnut, California: MSAC Philosophy Group, 2018), p.5.

19. *The Supernatural Philosopher*, p.6.

20. See Peter Raby, *Alfred Russel Wallace. A Life* (London: Pimlico, 2002), pp.184-199 and Charles H. Smith, 'Wallace, Spiritualism and Beyond: Change or no Change?' in *Natural Selection and Beyond. The Intellectual Legacy of Alfred Russel Wallace*, edited by Charles H. Smith and George Beccaloni (Oxford: OUP, 2010), pp.391-423.

21. Michael Denton, *Nature's Destiny. How the Laws of Biology Reveal Purpose in the Universe* (New York: Free Press, 1998), p.348.

22. Susan Blackmore, *Consciousness. An Introduction* (London: Hodder and Stoughton, 2003).

23. Fred Hoyle, *The Intelligent Universe. A New View of Creation and Evolution* (London: Michael Joseph, 1983), p.1.

24. Dawkins, *The Blind Watchmaker*, p.139.

25. Spetner, *Not by Chance. Shattering the Modern Theory of Evolution* (New York: Judaica Press, 1998), pp.161-74.

26. Spetner, *Not by Chance*, p.166.

27. M. Bowden, *Ape-Men, Fact or Fallacy? A Critical Examination of the Evidence* (Bromley, Kent: Sovereign Publications, 1977). For an unbiased account of this and other forgeries see John Reader, *Missing Links. The Hunt for Earliest Man*, 2nd edition (Harmondsworth: Penguin, 1988), especially pp.54-78 (on Piltdown Man).

28. Himmelfarb, *Darwin and the Darwinian Revolution* (London; Chatto and Windus, 1959), pp.310-11.

29. Darwin, *Origin of Species*, p.129.

30. Himmelfarb, *Darwin and the Darwinian Revolution*, p.278.

31. Sterelny, *Dawkins vs. Gould. Survival of the Fittest*, p.6.

32. Cited by Thomas Woodward, *Doubts about Darwin*, p.43.

33. *The Descent of Man and Selection in Relation to Sex*, edited by James Moore and Adrian Desmond (London: Penguin, 2004).

34. *Descent of Man*, p.107.

35. *Descent of Man*, p.119.
36. Himmelfarb, *Darwin and the Darwinian Revolution*, p.307.
37. *Descent of Man*, Introduction, p.xxvi.
38. Keith Thomas, *Man and the Natural World. Changing Attitudes in England 1500-1800* (London: Penguin, 1983), p.141.
39. Himmelfarb, *Darwin and the Darwinian Revolution*, pp.307-8.
40. The phrase is that of Roger Kimball in his Introduction to David Stove's *Darwinian Fairy Tales. Selfish Genes, Errors of Heredity and Other Fables of Evolution* (New York: Encounter, 1995), p. xiii.
41. Anthony Flew, *Darwinian Evolution*, p.25. See also Mary Midgley, *Evolution as Religion* (London: Routledge, 2002).
42. Himmelfarb, *Darwin and the Darwinian Revolution*, p. 308.
43. On Kropotkin see John Hands, *Cosmosapiens. Human Evolution from the Origin of the Universe* (London: Duckworth, 2015), pp.267-70.
44. See Penny Spikins, *How Compassion made us Human. The Evolutionary Origins of Tenderness, Trust and Morality* (Barnsley: Pen and Sword, 2015).
45. Darwin, *Descent of Man*, p.110.
46. Darwin, *Origin*, p.337.
47. Neil Broom, *How Blind is the Watchmaker? Nature's Design and the Limits of Naturalistic Science* (Downers Grove, IL and Leicester: Intervarsity Press, 2001), p.39 note 12.

48. The descent-from-apes theory is also questioned by Rob Stadler, *The Scientific Approach to Evolution. What they didn't teach you in Biology* (North Charleston: Createspace Publishing, 2016), pp.133-5.

49. A squib aimed at the consummate watchmaker Creator of Paley's *Natural Theology*.

50. Dawkins, *Blind Watchmaker*, p.162.

51. Broom, *How Blind is the Watchmaker*? p.73.

52. Thomas Nagel, *Mind and Cosmos. Why the Materialist Neo-Darwinian Conception of Nature is almost certainly False* (Oxford: OUP, 2012), p.12.

FOUR

COSMOS AND CHAOS

The Argument from Design has been brought back to a central position in our thought from which it was banished by the theory of evolution by natural selection more than a century ago. There seems now to be justification for assuming that from its first moment the universe was 'ordered' or programmed – was in fact Cosmos not Chaos. (W. H. Thorpe)[1]

More than half a century ago the philosopher Bertrand Russell had some grave words to deliver on the inextricable plight we all found ourselves in a universe bereft of meaning and metaphysical consolation:

That man is the product of causes which had no prevision of the end they were achieving; that his origin, his growth, his hopes and fears, his loves and beliefs are but the outcome of accidental collocations of atoms; that no fire, no heroism, no intensity of thought and feeling, can preserve an individual life beyond the grave; that all the labours of the ages, all the devotion, all the inspiration, all the noonday brightness of human genius are destined to extinction [...] *that the whole temple of man's achievement must inevitably be buried – all these things, if not quite beyond dispute, are yet so nearly*

certain, that no philosophy which rejects them can hope to stand. Only within the scaffolding of these truths, only on the firm foundation of unyielding despair, can the soul's habitation henceforth be securely built.[2]

As a literary historian, that crypto-military, somewhat macho tone of unyielding defiance triggered something of a shock of recognition. The sentiment undergirding those sonorous words would not seem out of place within the warrior ethos informing the heroic poetry of the Ancient world or that of the early Middle Ages. Such heroism under adversity is reminiscent of the unflinching bravery commended in the Old English poem which records a sombre Anglo-Saxon defeat at the hands of Viking raiders, *The Battle of Maldon* (991 AD): "Mind must be firmer / heart the more fierce, Courage the greater, / as our strength diminishes". In Russell's own day, an echo of that old heroic ethos had found expression in the influential Nietzschean philosophy of the *Übermensch* [élite human being] who should accept the 'death of God' without demur and go forth to triumph over the slave mentality (*Sklavenmoral)* which had held him and his kind in a disenfranchised condition for so many centuries. Whilst the instrumentalization of Nietzsche's philosophy by the Nazis to bolster the case for genocide led to an understandable neglect of Nietzsche after the Second World War, the German philosopher appears to have made something of a

comeback with the advent of a group of militant writers sometimes termed the New Atheists. Richard Dawkins in particular, in his *The God Delusion*, admonishes us in similarly crypto-martial tones to have the courage to face up to the inevitable void after our deaths and forge our own fearless paths through life in a similar spirit of bleak existentialist heroism as that advocated in the rather chilly and forbidding philosophy of Russell.

Nevertheless, excepting the views of self-confessed doctrinaire atheists, it is hard not to conclude that Russell's words have acquired a somewhat sepia-tinted datedness about them.[3] In the last half century, advances in the world of cosmology have revealed that our planet turns out to be biofriendly to a well-nigh miraculous degree – a verdant oasis in contradistinction to the little less than Hadean depths of the rest of the observable universe, it might be claimed. Through the lens of a celestial telescope, it is true, one can see little but the unfeeling immensity of that unremittingly hostile universe invoked by Russell, but if we look around us here on Earth we can see a planet which seems entirely discontinuous with the rest of the observable cosmos and abounding in a host of benign phenomena so numerous that they tend to go largely unnoticed. Russell's assumption of material forces churning away mindlessly over the aeons and at length spewing out the unplanned anomaly of human life – "a curious accident in a [cosmic] backwater" he once termed it – was first

formally challenged by astrophysicist Brandon Carter in 1973.

Against the received idea of a random universe Carter put forward what he termed 'the anthropic principle' (from the Greek *anthropos*, man; meaning a planet specially fitted for plant and animal life). According to Carter's detailed astronomical calculations, our planet was no longer to be seen as a lonely orphan randomly cast out into utter darkness but as a location which, astoundingly, could not have existed in its present state had it not been somehow planned from the first nanosecond of the Big Bang. We had known for some time of course that, on the scale of deep time, these life-friendly conditions had originally come about when an original conglomerate of swirling gases coalesced into planetary systems. Planet Earth is then thought to have evolved from its original condition of a red-hot molten ball prohibitive to life towards the cooler condition of a supportive biosphere. But this would not have been enough to *sustain* the condition of human-friendliness for prolonged periods of time, and this is where Carter laid his trump cards on the conference table – the evidence of the so-called 'cosmological constants', a seemingly self-evident factor which had been noted[4] but had not, surprisingly, been advanced in formal terms until Carter came on to the scene to connect the dots.

Already in the 1960s scientists had begun to notice a strange connection among a number of

otherwise unexplained coincidences in physics. It emerged that many of these mysterious values could be explained by one over-arching fact: the values had been necessary for the creation and preservation of human and other life. Some of the fundamental constants referred to include the protective electromagnetic force and the force of gravity which appear to be calibrated with extraordinary precision (to almost *innumerable* decimal points) for human needs. It is gravity's strength which literally grounds us without grinding us underfoot or – positing the historical hypothetical of gravity being very weak, causing us to fly off into the skies. Ministered to by the sun for its light, warmth and energy (there is also a 'solar shield' against harmful cosmic rays), the Earth caters perfectly for human needs. It appears too that we will be 'held in place' by these various forces for the foreseeable future and beyond. In normal circumstances any initially ordered state tends to randomness with the lapse of time and will eventually succumb to disintegrative, 'entropic' forces just like a property which is not properly maintained will tend to dilapidation. Such may indeed be the *ultimate* fate of our world, but it is, thanks to the constants, an inconceivably long way off yet!

What are we to make of this radical discontinuity between the earth – the only location having both a geosphere and a biosphere – and the rest of the cosmos? There could be no stronger contrast than that which

exists between our life-promoting biosphere and the unremitting deadness of the rest of the cosmos. This may be a minority opinion but I personally find many persons' desire for space travel hard to understand since such travel could only precipitate us into regions more horrific than Dante's circles of hell and Milton's "burning marl" combined. The desire to adventure beyond our habitable zone to regions unsupportive of life seems to me perverse – although of course I acknowledge that not all readers will share my viewpoint!

Given the fact that the universe seems, for all intents and purposes, endless, the statistical possibility of the formation of a biosphere must be exceedingly small, so much so that it would surely be difficult to quantify the infinitesimally small statistical probability of its coming into being. One does not need to be statistician to know that a point dot plus lots of noughts would be required. It was then for good reason that Carter concluded that planet Earth, whilst not central to the universe as had been supposed prior to Copernicus, was at the very least 'privileged' in a way denied to all other segment of the cosmos. Of course, this sounds prima facie to be a trifle Panglossian, after the fictional figure of Dr Pangloss, whom Voltaire invented to guy Enlightenment credulities with his fatuous refrain that eighteenth-century men and women were living "in the best of all possible worlds". And yet there is no doubting

Carter's evidence that we do indeed live at the best address in the universe, especially in contrast with the life-denying chaos lurking just beyond our charmed orb. In fact, one might go so far as to say that our benign scenario represents the only recorded exception to the 'too good to be true' rule! From that perspective, Carter's choice of the adjective 'privileged' seems an understatement. Some might prefer the term 'uniquely blessed' – meant either literally or metaphorically.

Carter's findings, initially announced at a specialist conference, have since been incorporated into the mainstream of cosmological understanding, despite dissenting opinions from some scientists embarrassed by the possible theistic implications of the new discoveries. In a welcome series of books aimed both at subject specialist and lay persons appearing over the past few decades, astrophysicist Paul Davies elaborates on the growing awareness by astronomers that the fitness of our earthly environment for life seems all too great to be accidental and that the laws of physics appear to be uncannily fine-tuned to support humankind. Such factors give the Earth its uniquely privileged position and run counter to the older opinion that it arose randomly by a process of cosmic vicissitude that "did not have us in mind" (as American zoologist George Gaylord Simpson opined some seven decades ago).

Arguably, these factors even go some way towards relativizing that demotion of humankind brought

about by the Copernican Revolution. Geometrically the Earth is of course indubitably heliocentric rather than geocentric, but this recent research has reinstated it in its position of at least symbolic centrality as the single locus of habitability amidst the lifeless maelstroms of our cosmic surrounds. For Michael Denton this signals a return to the kind of anthropocentric conception of the world which harks back to the pre-Copernican Middle Ages. People in the Middle Ages got many things wrong, he concedes, but their most presumptuous conviction, that of mankind's moral centrality, seems to have stood the test of time.[5]

One inference from the above is that life may not after all simply be the aleatory consequence of where the cosmic dice had happened to fall. It is at least warrantable in logical terms to infer that a power greater than mere happenstance may have been responsible for the benign dispensation. For that reason Denton begs to differ from modern liberal theologians who have too hastily resigned themselves to seeing science and theology occupying distinct epistemological realms, "non-overlapping *magisteria*" [=domains] in Stephen J. Gould's somewhat cumbersome phrase.[6] Many have glossed that expression as a polite euphemism in which the right to identify truth is ceded to science, whereas religion is confined to the more peripheral domain of subjective value. On the contrary, counters Denton: science has provided evidence that the laws of nature

(and whatever actuates them) appear specifically devised to support life. The *magisteria* overlap and motion towards scientists and theologians to come together to form a consilience [supportive dialogue]. On this reading of things, theologians and religious people in general have been too supine, trimming their positions for fear of the mighty Behemoth of science bearing down on them. This cringe would be more understandable if Great Science had a monopoly of truth, but it is less explicable in the context of an evolutionary theory whose truth-status is so eminently contestable.

The developments outlined above have unsurprisingly led to a quiet revolution in the way that mankind views itself vis-à-vis the surrounding cosmos. Ever since the findings of Galileo and Giordano Bruno had 'de-centred' planet Earth and established what is conventionally referred to as the principle of mediocrity (meaning that the earth, no longer special, takes its place as just one planet amongst literally numberless others), succeeding generations took their 'mediocre' status very much to heart. This led to the belief that the worlds of our solar system must be so similar to Earth that they must surely be inhabited by intelligent life. Curiously, this notion at one time was accepted by many influential Christian thinkers who could not see the purpose of these other planets unless God had chosen to populate them!

For many years, humanity seemed to want to convince itself that Mars was the most likely candidate

for inhabited status. When in 1877 astronomer Giovanni Schiaperelli observed what he perceived through his telescope as conduits on the Martian surface, he called them *canali*, a word which in Italian means a channel of some sort but not necessarily the man-made construction which the term has taken on in the English language. The linguistic confusion led to the idea that a race of extraterrestrial inhabitants was active on Mars – an idea given further currency in the successful science fiction of H.G.Wells. The American astronomer Percival Lowell even wrote a book entitled *Mars and its Canals* in 1905, but in the first decade of the twentieth century the idea that the *canali* were man-made (or, more accurately, 'extraterrestrial-made') was to be opposed by none other than Darwin's old comrade-in-arms from a previous era, the octogenarian Alfred Russel Wallace.

Wallace's short volume, *Is Mars Habitable*? was published in 1907 when its author was 83 years old. Wallace argued, using technical knowledge about planet cooling ratios relative to distances from the sun, that Mars was far too cold to allow water to flow into the so-called *canali* and that life was highly unlikely there since the atmosphere was too thin. Surprisingly, despite the work of Wallace and other, later sceptics, the 'canal' myth was finally laid to rest only in 1965 when the American Mariner 4 space probe sent back close-up pictures of the Martian surface. At this point it was observed that any 'canals' were due to chance

alignments of physical features on the surface of the planet, and the whole affair began to take on the retrospective appearance of a collective form of wishful thinking.

Hope, or credulity, springs eternal though, and the idea that there may be intelligent life elsewhere in the universe refuses to disappear completely. Even in the present day there have continued to be searches for at least microbial life on Mars – with disappointing results. In what appears to smack of what the French term 'professional deformation', it appears that scientists in particular may have fallen prey to what Jacques Barzun once termed the genetic fallacy, which he defined thus: "Because living things depend on certain chemico-physical things, therefore human beings *are* physico-chemical combinations and nothing more."[7] As Michael Polanyi once put it, physics and chemistry provide laws primarily for inanimate nature, not sentient beings, and should not be pressed to explain phenomena beyond their proper limits since such lower-level explanations are powerless to address the larger questions. Such is, however, not the mindset of NASA mission scientists whose space probes are based on the rather simplistic nostrum of 'water + organics = life': put these ingredients together in *any* habitable zone of the outer universe (if such could ever be found!) and eventually life will emerge.

For the many of us still awaiting a *convincing* explanation, this contention might appear to represent an impermissible leap of faith, but it is apparently all part and parcel of that deterministic school of biology which is the prevailing view of American Space science, and one which has spread to inform the views of much of the media commentariate. I was reminded of this way of thinking on watching a recent TV series on cosmology where an expert presenter (Michelle Thaller, assistant director of NASA's Goddard Space Centre) expressed a somewhat wistful sense of kinship with rocks because, as she put it, rocks and humans are both carbon-based! A form of what might be termed materialist credulity appears to afflict this guild of mathematical geniuses who interpret the skies for us. The same presenter also confessed that recent cosmological advances had not identified the habitable zones (let alone their postulated denizens) that she had once confidently hoped would be found. She concluded rather plangently: "We [i.e., the astronomer community] were expecting heaven, and instead found hell." A co-presenter of the same programme, Prof. Michio Kaku of the State University of New York, confronted by the same apparently limitless swathes of uninhabited and uninhabitable space, put the same thought more pithily: "Boy, were we wrong!"

The belief in the existence of extra-terrestrial civilisations had already been challenged (but clearly not

vanquished) by one of Darwin's Cambridge tutors, William Whewell, who in his *Of the Plurality of Worlds* (1853) made the attempt to demonstrate that the Earth is special and that life is unlikely elsewhere in the cosmos. Anticipating the anthropic principle by considerably more than a century, he wrote: "The Earth is the abode of life because it is fitted to be so by a curious and complex combination of properties". Whewell considered that, in any case, the existence of intelligent life on other worlds was incompatible with mankind's special relationship to God.

Whewell was able to buttress the non-theistic portion of his argument by appealing to the latest geological discoveries of Lyell, showing that for long tracts of time our Earth had remained uninhabited. This proved that worlds uninhabited by sentient persons are not impossible, having a precedent in the ancient geological condition of the once barren Earth itself. Whewell's prescient contentions have been taken up by other scientists such as David Waltham who in his book *Lucky Planet* acknowledges the "striking similarity" of many of Whewell's arguments to his own – except that Waltham baulks at accepting the reason Whewell gives for our good fortune: divine Providence.

In place of Providence, Waltham, referencing the title of his own book, simply puts our good fortune down to luck: "a good fortune that is inevitable somewhere in a big enough universe." Unpacking that

statement a little, it is possible to detect the influence on him of the recent, rather suspect 'multiverse' hypothesis. In the last few decades some scientists have advanced the theory of a whole ensemble of universes, the notion being that there is an almost infinite number of worlds parallel to our own, each with different natural laws. If there were countless other universes, the somewhat idiosyncratic logic goes, then the series of miraculous coincidences that produced life in our world one might seem the less miraculous since *somewhere* had to be the recipient of the great cosmic lottery win. The Earth on that way of thinking would become nothing but the fortunate accident of a process of cosmic natural selection, i.e. not the result of any providential arrangements. However, as Rupert Sheldrake and others have pointed out, this theory does not in fact logically exclude God: it simply increases the divine domains![8]

The majority of scientists reject the unsupported notion of a 'multiverse' (not to mention the rose-tinted credulity that benign outcomes can be expected by accident given enough time/opportunity/space). The consensus about the multiverse now is that it is 'a nice idea' but one which is *wholly* 'conceptual' (for which read 'imaginary') and wholly without any factual foundation. Being unobservable and untestable, it can in addition hardly aspire to any empirical status at any time in the future either. It is therefore hardly an analogy that can be convincingly appealed to and it must be said that

Waltham's adducing of 'luck' as his preferred causative factor seems to me to be just as much a cop-out as Dawkins's belief in time as the eventual bestower of all benign outcomes. For me at any rate, Waltham's conjecture is less convincing than Whewell's old providentialist argument if measured against strict standards of logical probability, counter-intuitive as that will doubtless seem to many – including, in some sense, myself.

Proxy Wars

One of Darwin's most feared opponents, St. John Mivart, once noted: "If the *odium theologicum* has inspired some of its (Darwinian) opponents, it is undeniable that the *odium antitheologicum* has possessed not a few of its supporters."[9] By this he meant that both Darwin's supporters and his detractors were biased by their religious or else anti-religious preconceptions and that positions taken up pro or contra Darwin were in an important sense proxies for profounder ideological beliefs. Mivart was both a distinguished scientist and a (Catholic) theist and we may surmise that, although most of his objections to Darwinism undoubtedly rested on scientific foundations, it is not possible to discount the prima facie possibility that *some* of his opposition was religiously motivated. What is equally clear, however, is that the opposing camp was motivated in part at least by

the desire to champion the opposing cause of (philosophical) materialism. A contemporary German scientist, August Weismann, admitted this with some candour in an essay published in 1893:

We accept natural selection not because we are able to demonstrate the process in detail, not even because we can with more or less ease imagine it, but simply because we must –because it is the only possible explanation that we can conceive. We must assume natural selection to be the principle of the explanation of the metamorphosis, because all other apparent principles of explanation fail us, and it is inconceivable that that there could be another capable of explaining the adaptation of organisms without assuming the help of a principle of design.[10]

Nor is Weismann simply an historical curiosity. In our own day, Nobel prize holder Harold Urey expressly described science's adherence to Darwinism as "an article of faith", whilst the Harvard geneticist Richard Lewontin echoed Weismann a century later:

We take the side of science in spite of the patent absurdity of some of its constructs [...] *in spite of the toleration of the scientific community for unsubstantiated 'just-so' stories because we have a prior commitment, a commitment to materialism.*[11]

If we are to call a spade a spade, the above statements can only be read as exhibiting an extraordinary degree of intellectual dishonesty announced with uncontrite *chutzpah*. Behind these attitudes one gains the impression of a determination to fit Darwin into a preconceived Great Men of Science narrative next to Copernicus, Galileo and Newton. Viewed as a beacon of the scientific Enlightenment and selected to be the poster-boy for the *citius*, *altius*, *fortius* watchword of scientific progress, the paranoid fear seems to be, if Darwin were to be toppled – or even questioned, this would involve the rejection of the scientific method *tout court* and the return to a dreaded theocratic ordering of things.

Whereas pre-Darwinian generations believed unselfconsciously that Nature's laws were God-given, post-Darwinian scientists have the greatest difficulty with such discourse. In the post-Darwinian era naturalistic explanation alone was valued and metaphysical speculation shunned since "science is generally thought of as excluding from its scope any higher meanings. When it ceases to do so it ceases to be science and becomes philosophy."[12] Hence the majority of science professionals reject any kind of 'God-talk', the more so if it is suspected of being camouflaged for tactical reasons; hence the frequent imputation of 'neo-

creationist' tendencies to members of the Intelligent Design grouping. How justified is the imputation?

Generalisation is clearly not possible in the absence of a party line (what is referred to for convenience as the Design group comprises a disparate array of scientists of different nationalities united only by their doubts about Darwinism). There are of course certainly evangelical movements, especially in the USA, which seek to push a fundamentalist agenda by attempting to 'weaponize' the scientific controversy for their own purposes – these movements presenting a mirror image of attempts to instrumentalise Darwinism for the cause of militant atheism made by Richard Dawkins. However, such splinter groups have little to do with the many mainstream science authors who quite plausibly claim that their conclusions represent a scientific rather than a religious inference, and that their personal beliefs (some but by no means all have religious affiliations) are simply not to the point.

Paul Davies, for instance, explains in his book *The Mind of God. Science and the Search for Ultimate Meaning* (1992) that he is not religious but that he cannot conceive of the Earth as a "purposeless accident" since "*through my scientific work* I have come to believe more and more strongly that the physical universe is put together with an ingenuity so astonishing that I cannot accept it merely as a brute fact" (italics supplied). I have chosen to highlight the phrase "through my scientific

work" because it has a bearing on what the late humanist philosopher and doyen of the British Rationalist Association, Professor Anthony Flew, termed his own scientific conversion. In his book *There IS a God* (2007), Flew moved from a rationalist to a theistic (or at least deistic) position. For decades, he had been a world authority on the philosophy of religion and an influential atheist philosopher, but his conversion had been determined by fresh scientific evidence not available in his youth.

This evidence, Flew explained, stemmed largely from the sheer intricacy of natural structures, especially at the micro-level, which can only now be fully appreciated by analogy with the miniaturisations enabled by advanced nanotechnology. He wrote just before his death in 2010: "It now seems to me that the findings of more than fifty years of DNA research have provided materials for a new and enormously powerful argument to design." The invention of the electron microscope in 1946 enabled insights into the microworld which would have been unimaginable in the pre-War world in which he grew up. Molecular biology has increasingly shown that the sub-microscopic world seems as extensive in its own terms as that vaster world of extra-galactic structures and exoplanets. It sometimes appears to the present author to represent nothing so much as an ever smaller, infinite-regression sequence of Russian dolls,

the number of dolls visible depending only on the telescopic power of the apparatus used to study them.

Individuals have long been aware, in William Paley's words, that "the works of nature are greater than those of mankind in a degree which exceeds all computation." Douglas Dewar, the largely forgotten British scientist who opposed Darwinian doctrine between the two World Wars, wrote: "The simplest cell, the unit of every organism, has a structure compared to which that of a modern printing press or a watch is simple and clumsy."[13] However, advances in the last half century or so have been so great that neither Paley in the 1800s nor even Dewar in the 1930s could have imagined the more recent discovery of what was tantamount to a whole undiscovered continent in the subatomic world. Being told that Nature's protein synthesizing apparatus is of the order of several thousand million million times smaller than the smallest piece of functional machinery ever constructed by man would, I believe, lead most people to seriously scratch their heads over who or what could *possibly* have been behind something so microscopically small. I personally cannot even *imagine* the kind of agency which could have been responsible for fashioning such a micro-wonder – which leads me to conclude that the agency is very unlikely to have been natural selection.

This newly discovered micro-universe was what Flew was responding to. He was more than willing to

concede that his present position could have religious implications, but quite reasonably pointed out that it did not depend on religious presuppositions. Those at the time who resorted to cod psychology to suggest that Flew's advancing years made this a kind of pre-deathbed conversion were in my opinion not simply being crass and in lamentable taste but – far more to the point –were very wide of the mark. Flew described his striking *metanoia* as "a pilgrimage of reason", and, notwithstanding the apparent historical incongruity of persons finding their way to God by reason rather than by faith, his move might justly be characterised as an instance of what is essentially a new (and as yet little studied) phenomenon: scientific conversion.

In any case, to set the record straight, Flew did not become a Christian in the conventional sense; he merely accepted the *existence* of God. He described his new position as a form of deism, accepting that there is supernatural intelligence responsible for creating the universe, but he rejected special revelation in the form of the Bible and the notion of a personal God in the sense of one who watches over his terrestrial flocks. However, it is fair to say that, until his death in 2010, Flew expressed at least an *openness* to the possibility of special revelation, but nevertheless made it clear that his present view was that God does not intervene, and has not intervened, in human affairs since Creation. To quote Flew in his own terms:

I must stress that my discovery of the Divine has proceeded on a purely natural level, without any reference to supernatural phenomena. It has been an exercise in what is traditionally called natural theology. It has had no connection with any of the revealed religions. Nor do I claim to have had any experience of God or any experience that may be called supernatural or miraculous. In short, my discovery of the Divine has been a pilgrimage of reason and not of faith.[14]

Flew and other intellectual dissenters, many of whom come from the same academic ranks as the Darwinian orthodox, should not in my opinion be lightly doubted or have their *bona fides* discounted because of prejudice. It would certainly be anachronistic to frame this modern debate as 'Enlightened science *versus* unexamined Creationism Part 2' (the binary best known from the infamous Scopes 'monkey trial' of 1925 in Tennessee).[15] Such is unfortunately the kind of knee-jerk reaction of those who oppose any dissent from Darwinian orthodoxy. Patently this kind of misrepresentation of an opponent's position does nothing to help the cause of rational public debate (and is, incidentally, demeaning to those who advance such misrepresentations). Imputations of bad faith (which include mocking put-downs of honest doubts about Darwinism as being just so many variations of 'The

Argument from Incredulity') are valueless – except in the tactical sense of deflecting attention from the gravamen of the Design scientists' charges.

Those charges, in the arguments of Denton, Flew, Behe, Dembski and other heavyweights, contain no discernible anti-materialistic invective or coded jeremiads about godlessness: their focus is squarely on the substantive issue of the theoretical and empirical inadequacies of the Darwinian paradigm. Referencing Thomas Kuhn's work on paradigm shifts, they see Darwinian theory persisting for lack of a better alternative rather than on the basis of its explanatory merits. To be sure, Intelligent Design may not be science in the sense that it can develop new knowledge by hypothesis-testing, followed by modification of the original theory based on experimental results and then renewed testing as a 'control' to the preceding experiments – but on the other hand Darwinian natural selection has no testable scenarios either, and in the very nature of things never can have – unless a particularly convincing cache of those ever-elusive missing links should be disinterred.

NOTES

1. W. H. Thorpe, *Purpose in a World of Chance. A Biologist's View* (Oxford: OUP, 1978). p.11-12.

2. Russell, *Why I am not a Christian* (New York: Simon and Schuster, 1957), p.107.
3. This was pointed out as early as the 1970s by philosopher Richard Spilsbury, in *Providence Lost. A Critique of Darwinism* (Oxford: OUP, 1974), especially pp.111-130.
4. Darwin's tutor, William Whewell, had made reference to the uncanny suitability of the planet for life and so had Alfred Russel Wallace in his *Man's Place in the Universe* published in 1903. See Michael A. Flannery, *Alfred Russel Wallace. A Rediscovered Life* (Seattle: Discovery Institute Press, 2011), pp.87-9.
5. Denton, *Nature's Destiny, How the Laws of Biology reveal Purpose in the Universe* (New York: Free Press, 1998), p.370.
6. See Gould's *Rock of Ages. Science and Religion in the Fullness of Life* (New York: Ballantine, 1999).
7. Barzun, *Darwin, Marx, Freud. Critique of a Heritage*, revised second edition (New York: Doubleday Anchor, 1958), p.51.
8. Sheldrake, *The Science Delusion* (London: Hodder and Stoughton, 2013), p.12.
9. Mivart, *The Genesis of Species* (1871), p.12.
10. Cited by Philip G. Fothergill, *Historical Aspects of Organic Evolution* (London: Hollis and Carter, 1952), p.118.
11. Charles Coulton Gillispie, *Genesis and Geology. The Impact of Scientific Discoveries upon Religious Beliefs in the Decades before Darwin* (New York: Harper, 1959), p.30.
12. Cited by Lennox, *Can Science Explain Everything?*, p.61.
13. Dewar, *More Difficulties of the Evolution Theory*, p.5.
14. Flew, *There IS a God*, p.85.
15. Readers interested in this subject can find a good account in Edward J. Larson's *Summer for the Gods. The Scopes Trial and America's Continuing Debate over Science and Religion* (New York: Basic Books), 1997.

FIVE

THE MYSTERY OF MYSTERIES: LIFE ON EARTH

Scientists should never present themselves as certain when there is doubt. The very success and truthfulness of science is founded on doubt and scepticism. It moves forward by continually rethinking, reobserving and rechecking against reality again and again to expose the flaws in current ideas. (Fern Elsdon-Baker)[1]

Noam Chomsky once remarked that all matters of human puzzlement can be subdivided into two categories: problems, which can be solved, and mysteries, which cannot (citing free will as one such mystery and human consciousness as another).[2] He came to the conclusion that our minds, like those of other species, must inevitably experience 'cognitive closure' with regard to some of the profoundest topics of human enquiry. Confirmation of this apprehension is to be found elsewhere in the animal world. Spiders cannot contemplate the concept of fishing, but birds understand everything they need to know about catching fish, but cannot understand the concept of, for instance, democracy. What remains inaccessible to a dog may be grasped by the relatively higher intelligence of the

chimpanzee, but the chimp will still remain cognitively closed to many domains we humans have no difficulty figuring out. By extension, a human must encounter similar limitations to what (s)he can and cannot grasp. Darwin himself acknowledged this limitation when he stated that some things were unfathomable to us and that we had no more chance of understanding them than a dog would be able to fathom the mind of Newton.

For this reason there is no shortage of awkward questions which bright young people ask and adults can't answer, and of course these are the 'really important' questions, the existential biggies which people of all ages would love to have answered but in the face of which science falls silent, such as: how did a once barren terrestrial environment give rise to life forms? How did the resources deemed necessary to this process – *self-replicating* molecules *bearing genetic information* – arise in the first place? Where do the laws of physics *come from*? What is the ultimate *origin* of the genetic code and who/what *directed* it to produce plant and animal species? Why are we safely cocooned in a cosmic Goldilocks zone when so many parts of the universe are more reminiscent of Dante's *Inferno*? What was before the Big Bang? Why is there something rather than nothing?

The laws of Nature do not, alas, answer any of the above. Physics can explain much of the physical universe but not the laws of physics themselves. In fact,

scientific laws do not *explain* the world to us at all; they merely *describe* certain regularities, and are often referred to for that reason as secondary causes, in contradistinction to the first cause – historically referred to as the *causa causarum*, the ultimate cause of all things. Sir Isaac Newton made this point after his discovery of gravity which, he remarked, "explains the motions of the planets, but cannot explain who set the planets in motion." That argument was taken up by the proponent of natural theology, William Paley, as an extension to his celebrated watchmaker analogy. Paley describes how the finder of that famous time-piece would hardly have been convinced if somebody had made the attempt to 'explain' his find as having been manufactured by

the result of the laws of metallic nature. It is a perversion of language to assign any law as the efficient, operative cause of anything. A law presupposes an agent [...] *Without this agent, without this power, which are both distinct from itself, the law does nothing, is nothing.*[3]

Oxford mathematics professor, John C. Lennox in his book, *God and Stephen Hawking* develops Paley's point by incorporating and adding to points first made by celebrated Oxford don and author, C. S. Lewis. Lennox reminds us that the laws of physics are descriptive and

predictive but not creative in their own right and that the laws of arithmetic are no more able to *produce* anything than Newton's law of gravity could have *created* gravity. The laws can explain how the jet engine works, but not how it came to exist in the first place. The only correct answer to *that* question would be "the inventor Frank Whittle and a team of highly skilled aeronautical engineers". Lennox therefore roundly doubts the logical coherence of Hawking's conclusion that "the universe arises naturally from physical law". Indeed, when Galileo famously stated that the "the laws of nature are written by the hand of God in the language of mathematics", he might have been more than a little bemused to have been told that a future scientific *confrère* would even moot the possibility of mathematical laws writing themselves. Scientists may try to get rid of the notion of a Creator but are then obliged to confer quasi-creatorial powers on blind forces, such as the laws of mathematics or physics, which are manifestly incapable of creating anything. As a reality check against what he terms such "(science)-fiction arguments", Lennox offers a useful modern-day parable:

In the world in which most of us live, the simple law of arithmetic itself, 1+1=2, never brought anything into being. It certainly has never put any money into my bank account. If I put £1000 into the bank, and later another £1000, the laws of arithmetic will rationally explain how

it is that I now have £2000 in the bank. But if I never put any money into the bank myself, and simply leave it to the laws of arithmetic to bring money into my bank account, I shall remain permanently bankrupt.[4]

Ultimate questions must always be beyond the scope of empirical science as conventionally defined. It might then have been truer to Darwin's private anguish about the viability of his theory had he applied the expression he used about the origin of life to its sequel and simply stated that the *whole* question of human creation/evolution was a work in progress and, as to definitive conclusions, these must remain, to repeat Darwin's Latin tag, "*ultra vires* [beyond our powers] in the present state of our knowledge". Such a concession would certainly have been more consistent with his riven state of mind on this issue, a conflict which endured with him till the moment of his death in 1882.

The *Origin of Species* is full of such phrases as "the claws impressed on matter by the Creator". Presumably Darwin could not merely have been including such phrases as a gesture towards public opinion, because they appear in the same form in his first pencil sketch of his theory written in 1842 and read only by himself. The Darwin who in his published work set his face so firmly against the notion of theistic evolution espoused by Lyell and Agassiz can still write to a correspondent in 1876 of

the extreme difficulty or rather impossibility of conceiving this immense and wonderful universe, including man with his capacity of looking far backwards and far into futurity, as the result of blind chance or necessity. When thus reflecting, I feel compelled to look to a First Cause having an intelligent mind in some degree analogous to that of man; and I deserve to be called a Theist.

Three years later, and completely contrary to that viewpoint, Darwin sent his famous "warm little pond" letter to botanist Joseph Hooker (February 1st, 1871), in which he expresses a notably lively interest in the possibility of abiogenesis:

It is often said that all the conditions for the first production of a living organism are now present, which could ever [=always] *have been present – But if (and Oh! What a big if?) we could conceive in some warm little pond with all sorts and ammonia and phosphoric salts, – light, heat, electricity etc., present, that a protein compound was chemically formed, ready to undergo still more complex changes, at the present day such matter would be instantly devoured, or absorbed, which would not have been the case before living creatures were formed.* [5]

Darwin's conflicted thinking can sometimes be exasperating for those wishing to figure out what his theological conceptions were in precise terms, because he appears to have been genuinely ambivalent on the subject throughout his life. This "epistemological double vision" resulted from the fact that, "early in his career he largely dropped theology from his science but not from his world view".[6] His vacillating thoughts do much to explain why, after first publication in 1859, the *Origin* was eventually to go through five more, heavily revised editions under pressure from a wealth of scientific objections to his theory.

As intransigent as Darwin might have seemed in pressing or in some cases cunningly insinuating many points in the *Origin*, in a way which his latest biographer, A. N. Wilson, rightly terms "slippery", he nevertheless in time agreed to relent on a number of issues. As early as 1862 Darwin began to entertain doubts about the theory of natural selection as the *sole* determining factor in the process of evolution, and began to seriously consider the possibility of plural causation. Appealing now to early nineteenth-century evolutionary theories from which he had heretofore tried to distance himself like those of Buffon and of his grandfather, Erasmus Darwin, he was now prepared to moot the possibility of the environment triggering changes and he even flirted with the Lamarckian idea of the relative use/disuse of organs as determinants of survival. In the

sixth edition of 1872 Darwin expressly stated that "I formerly underrated the frequency and value of these latter forms of variation". In such ways did he make the honourable attempt to incorporate responses to criticisms levelled at him by other scientists, which meant that the last, heavily emended version of the *Origin* was markedly different from its 1859 original. All these changes, however, took a toll on the clarity of his exposition in a final edition marked by "self-contradiction, hedging, endless shuffling with words, vacillation".[7]

Darwin, with his often withdrawn, almost quietist disposition, was temperamentally unfitted for confrontation, and no few commentators have concluded that his major digestive problems (which may possibly, with the benefit of clinical hindsight, have had lactose intolerance or Crohn's disease as their point of origin) could have had a psychosomatic component. It is significant that his so-called bulldog, Thomas Huxley, was often deputed to go in to intellectual battle for him. This occurred both at the notorious Oxford 'monkey' debate in 1860 in the aftermath of the furore caused by the recent publication of his *Origin of Species*, when it was left to Huxley to face down the formidable opposition of Bishop Samuel ('Soapy Sam') Wilberforce, and on many occasions thereafter. One gets the impression finally that the accumulated

pressures suffered by Darwin into later age meant that in the end he did not know quite *what* to believe.

Remarkably, a comparable kind of cognitive dissonance emerges in the case of a number of scientists working in the fields of evolution and cosmology in our own era. Francis Crick, wearing his layman's cap as it were, could talk of creation in terms of its being a kind of crypto-miracle ("functionally not dissimilar to a miracle"). Yet as a scientist his main aim, in the report of his surviving son, had been a battle against animism (this of course a coded reference to the divine). Sir Fred Hoyle advanced the thesis that the bio-friendly nature of our world appeared to be a "fix" or "put-up job", as if "a super intellect had monkeyed with the laws of physics" for the purpose of spawning and supporting life. At the same time, however, he was capable (wearing his scientist's hat) of issuing his famous 'howler' of panspermia in the attempt to side-step any invocation of the deity. Even the arch-materialist Richard Dawkins could write that life is "almost unimaginably complicated in directions that convey a powerful illusion of deliberate design" and in the sixth chapter of his *Blind Watchmaker* there occurs this rather disarming comment from someone not noted for self-doubts: "Does it sound to you as though it would need a miracle to make randomly jostling atoms join together into a self-replicating molecule? Well at times it does to me too." Cumulatively, these instances of seeming ambivalence

amongst science professionals prompt readers to wonder how certain of their ground many science writers *really* are.

To sum up: some one hundred and sixty years ago, in place of traditional, theistic explanations ultimately deriving from the Genesis narrative, a theory was advanced which depended for its point of departure on the prior operation of a single, preternaturally fortunate chemical reaction so seemingly impossible in material terms as to be unreproducible by man. The putative reaction is held to have created a simple organism that metamorphosed over time into a succession of progressively more complex plant and animal species. Humankind had not come about by dint of any *agency* at all, but rather by a form of occult automatism resulting from incalculably numerous sequences of biochemical lucky chances. Those initial lucky chances, benignly compounded by further, exponentially multiplying sequences of preternatural luck, were to spur the whole evolutionary development from microbes to man. In contradistinction to all prior evolutionary speculations, the new theory specifically denied the immanent presence of any motive force actuating the process. Furthermore, given that we are asked to accept that everything evolved without any template or direction, we can only conclude from this that the universe must have quite literally created itself!

If you are in any doubt that this is indeed the received evolutionary narrative you have only to look at the statement of a close intellectual ally of Richard Dawkins who referred to the creation as being an "agentless act"[8] – a grand contradiction in terms which even the words' Latin roots proclaim. Things do not happen as if by magic or 'just like that,' as magician *extraordinaire* Tommy Cooper used to demonstrate on his rib-tickling TV shows by his unmasking of run-of-the-mill conjurors' (albeit harmless) deceptions. The main butt of Cooper's humour, for those not old enough to remember, was not so much himself for his (deliberate) bloopers as the poor magician *manqué* (as many supposed), but rather his audience's credulity (or at least half-belief) in supposing that things *could* happen by magic. He was essentially getting us to laugh at *ourselves* for entertaining such a foolish notion, his *shtick* being essentially a lower-case form of the Brechtian alienation effect.

I sometimes think of the comedian's mocking catch-phrase, 'just like that' as being a snappier (and more honest) synonym for the more portentous 'natural selection'. For as nineteenth century Princeton theologian Charles Hodge saw the matter, natural selection was "a blind process of unintelligible, unconscious force, which knows no end and adopts no means."[9] If you do not want to make the damning admission that your theory is in any sense magical or

metaphysical you will have to resort to euphemistic periphrasis. You would then have to say something to the effect that any organism produced by the process Darwin envisioned must necessarily have emerged in unfathomable, wholly unspecifiable ways which could not have been internal to an evolutionary process said to be entirely non-directive and random. Yet however circumspectly and portentously phrased, a theory which replaces agency and teleology with fortuity and unexplained automaticity, might still, whatever its packaging, be termed magical thinking by unbiased adjudicators. Others not bound by the etiquette and proprieties of academic debate might simply roll their eyes and issue that *non plus ultra* of demotic put-downs, 'Yeah, right.' Yet such unpolished opinions would, I suspect, have received the stern but more decorous backing of the late Sir Alfred Ayer and the earlier twentieth-century philosophical school of logical positivism. Adherents of that philosophy famously had a quick way with empirically unsubstantiated statements, calling them non-sense in the technical sense that they are cognitively valueless and cannot provide even the *basis* for a rational debate – for which reason they are to be ignored as being beneath rational consideration.

Advancing tenuous theories to purportedly explain things which are not only beyond all human comprehension but which are not even to the scale of human comprehensibility, is a procedure conspicuously

at variance with Einstein's more dignified acceptance that "the laws of nature manifest the existence of a spirit vastly superior to that of men, and one in the face of which we with our modest powers must feel humble". Apropos of that glaring disproportion, James Le Fanu recently commented on the "marked discrepancy between the beguiling simplicities of evolutionary theory and the profundity of the biological phenomena it seeks to explain".[10] The author, a medical doctor and writer, challenges us in the subtitle of his book to ponder "how science rediscovered the mystery of ourselves", and draws attention to issues to which most of us, myself included, I have to confess, had previously paid little heed. His intervention merits a short consideration of its content since it has an important bearing on the frustratingly Sisyphean task faced by all would-be theories of evolution.

Every day, writes Le Fanu, we are the unwitting beneficiaries of an incalculable number of invisible natural wonders such as the purifying function of the liver (which is able to perform more functions than the largest chemical refinery), or the autonomous functioning of the heart, whose diminutive size belies its enormous pumping power (artificial heart machines, being the size of a chest of drawers, have to be hauled around on trolley wheels and can only be used for a number of hours as a stop-gap before transplant), or our physiological capacity for bodily self-repair: think (I

might add) of a bicycle puncture mending itself automatically or the implication of the April Fools advert put out by BMW some decades ago to the effect that the special paints applied to the company's cars were self-cleaning! What seems amusingly preposterous in the case of human manufacture is perfectly practicable in human physiology via the cleansing function of the liver.

We might also usefully ponder the fact that there exists a diminutive universe in each of our individual cells which went all unsuspected for millennia before mid-20th century advances in electron microscope technology. Or what about that bodily system we all refer to glibly (but uncomprehendingly) as the immune system – how many people know how that works? No, I didn't either. This is what Wikipedia says about its well-nigh preternatural complexity:

The immune system is a host defence system comprising many biological structures and processes within an organism that protects against disease. To function properly, an immune system must detect a wide variety of agents, known as pathogens, from viruses to parasitic worms, and distinguish them from the organism's own healthy tissue. In many species, there are two major subsystems of the immune system: the innate immune system and the adaptive immune system. Both subsystems use humoral immunity and cell-mediated immunity to perform their functions. In humans, the blood-brain barrier, blood-cerebrospinal fluid barrier, and similar fluid-brain barriers separate the peripheral

immune system from the neuroimmune system, which protects the brain.

Needless to say, our bodily organs are quite beyond the abilities of man's bio-engineering to reproduce. To give a prime example, experiments in the United States to introduce artificial hearts to patients had to be withdrawn some decades ago by the US Food and Drug agency when the fatalities topped two hundred with no realistic hope of medical experts being able to improve their technology. Forty years of research and development and forty billion dollars went down the drain. If such gargantuan efforts and national debt rocking expense could not fashion a functioning heart-substitute, it becomes all the more difficult to imagine a heart being constructed by the serendipity of natural selection.

Curiously, many complex wonders of nature have been, as it were, hiding in plain sight for decades, even centuries. Nature was once perceived to be alive with signs and portents by our medieval and even Renaissance forbears. Shakespeare's use of the technique of pathetic fallacy[11] credits Nature with a form of indwelling spirit which could actively communicate its meanings to humans.[12] By contrast, the post-Enlightenment centuries brought with them a steady 'disenchantment' of the natural world, and a tendency to regard our natural surrounds as prosaic 'givens' of little

account. Our ignorance of Nature's ways is the more culpable, writes Le Fanu, because, unlike previous generations, we now know of the deep biological complexities that underpin the effortless simplicities of our daily lives. We should therefore be more appreciative of nature's ingenuity and the sheer ease with which we see, hear, talk, eat, drink, make love and reproduce our kind. Such should be the central core of school biology lessons, promoting a sense of wonder in the young mind at the very *fact* of existence. The reason that it does *not* form that core is because scientists (and hence the educational establishment), subscribing to the materialist/ mechanistic model of human functioning, tend not to 'do' wonder, and are the less likely to advert to the sheer immaterial richness of human life.

As a footnote to Le Fanu's argument I would add that we also betray collectively some element of false entitlement about our innumerable boons: we feel hungry, eat, and by some magical alchemy of which we know nothing – and care less – our bodies transform the food into the very substance of our physical frames. We take it for granted that we are born with *hinged* bones to provide low-friction articulations, eye-protectors (eyelids), vitreous humour to lubricate the eyes so that they don't feel scratchy, an optic nerve to transmit electrical impulses to the brain to decode visual cues so that we can literally 'know where we are'; that broken bones will, unlike broken vases, 'set', that minor wounds

will heal by the process to which medical people refer with a complacent lack of affect as 'bodily regeneration'.

As far as external nature is concerned, we are the beneficiaries of plants' photosynthesis, the process by which plants convert light energy into chemical energy and produce oxygen, yet we give little thought to this bedrock of our existence (needless to say, nobody has the first idea about how photosynthesis might have 'evolved'). The same goes for the sun's warming rays and all those other cosmological constants described above: our only concern with them is that they *stay* constant! As for that huge symbiosis by which all life is connected productively in a web of interrelated functions (rainwater for crops, grazing animals fertilising the soil with dung, worms aerating the soil so that crops can grow et al.) this is just another part of what we see as our unearned entitlement (assuming we even bother to think about such things at all). The list could be extended almost limitlessly but perhaps I should stop there lest I be suspected of pursuing a Paleyesque quest to gather materials for a twenty-first century theodicy!

"Can *nothing* in nature be simple?" has been the question often posed by biology students. The answer is, frankly, no, and the only honest response to the extraordinary intricacies of 'simple' nature must be wonder. Our medieval ancestors had a keen awareness of what at the time were referred to as *mirabilia* and which seventeenth century science referred to

unselfconsciously as natural miracles. I am tempted in light of the above to suggest that the very concept of a 'miracle' may need a little semantic tweaking. From the evidence we see around us every day, miracles do not consist in the *suspension* of natural laws: they are simply the normal functioning of those laws (at least in the *de facto* sense). I sometimes think of Le Fanu's words when driving the family car and by dint of that wondrous coordination of brain, eyes, arms, hands, legs and feet with which we are endowed, manage not to turn the roads of southern England into some sort of glorified dodgem rink.

Life on earth has traditionally and for good reason been termed the mystery of mysteries, and there is much to be pondered in the contention of nineteenth-century Harvard professor, Louis Agassiz, that life's mysteries were no nearer to being solved after the publication of the *Origin of Species* than they had been before that date. Needless to say, neither Darwin nor Wallace would have been minded to see things in that way because both were responding to their own internalised challenges in the competition to find something no others had been able to find in a century of evolutionary thinking: the Holy Grail of an entirely naturalistic explanation for life. In retrospect we can see that no answer had been found previously for a very good reason, which is that the mystery is so impenetrable as to be beyond the scale of human ability to solve, and

pseudo-explanations serve only to confirm the sense of hopeless impasse; but none of this was in the minds of our two would-be pioneers. Both men pressed on, acting as much in the spirit of conquistadors as discoverers (Darwin famously rushed out the publication of *Origin* when he feared Wallace might pip him to the post).

Their goal, albeit not of course explicitly acknowledged (in deference to that laudable Victorian code of gentlemanly reticence which has fallen into disuse in the last half century) was to become recognised as The Lyell of Biology. They thereby hoped to establish the prestige of a discipline which, they were determined, should slough off old-fashioned and discredited Biblical notions and so place biology within the prestigious sphere of 'pure' science. By analogy with Lyell's geological work, which had rendered the Biblical Flood superfluous, the quest of Darwin and Wallace was to render the Christian God not (necessarily) non-existent but certainly superfluous to the rolling out of the universe *after* the moment of Creation. But in order to advance their new paradigm, they were obliged to transfer agency to the process of natural selection which, unfortunately, contained within it an insurmountable problem, as Wallace later acknowledged.

The problem was that the 'agency' of selection invoked by Darwin and, for a limited period, Wallace, was an agency *sui generis* in that, unlike all other agencies known to mankind, it possessed little operative

functionality! Contrary to all accepted canons of logic, or even common sense, the process of *selection* was held to operate *unselectively* and no notion of purpose was permitted to obtrude into the multiple revolutions of its biological lottery. We are truly in surreal territory here. The irreverent analogy that has sometimes struck me is the bonkers situation of a car salesman trying to market the chassis of a car without any engine underneath its bonnet whilst at the same time assuring his customer that the car would function perfectly well *without* an engine. This major contradiction was first adverted to by Bishop 'Soapy Sam' Wilberforce in his response to the publication of the *Origin.*

Contrary to his parody as an unctuous and obscurantist buffoon, Wilberforce was in fact an Oxford First in Mathematics with a keen interest in natural history and a good working knowledge of animal breeding methods, combined with a killer sharpness in debate, and his observation was that the selection process described by Darwin implied and indeed required the presence of an "impersonal deity" to make it logically coherent. Even if one deletes the theistic insinuation of Wilberforce's phrase, his point that *some* power must have directed the selection process still stands, a contention which is conceded (albeit unwittingly) in the anthropomorphic language employed by Darwin when he wrote of the constant scrutiny, preservation, rejection and resulting improvement

involved in the process of natural selection, here with reference to the human eye,

We must suppose that there is a power [sic] *always intently watching each slight accidental alteration of the transparent layers* [of the eye]*; and carefully selecting each alteration which, under varied circumstances, may in any way, or in any degree, tend to produce a distincter image.* [...] *natural selection will pick out with unerring skill each improvement.*[13]

One might legitimately ask, I believe, how it is possible to 'intently watch' and 'carefully select' unintelligently and randomly. That is entirely discrepant with what Darwin elsewhere claimed for the aleatory process he invoked. The contradiction points to a mighty conceptual confusion, and I would surmise that the very phraseology Darwin uses reveals that he could not but have been aware of the illogicality of his own position, even if at some barely conscious level of apprehension. For it is hardly possible to talk of what Lucretius termed the random flux of things, of which I take natural selection to be in some sense a modern reformulation, as an *agency* in any logically coherent sense when the fundamental definition of random flux or random selection (or more properly, preservation, since the former is an arrant contradiction in terms!) means something like 'blundering about witlessly'.

Our medieval ancestors would have certainly baulked at such a notion. Luck was often personified in the popular iconography of the medieval period as that supremely fickle goddess, Dame Fortuna (Lady Luck) who, together with the double-headed pagan deity, Janus, was viewed as the least trustworthy of the gods of the Classical pantheon. Chaucer wrote scathingly in his *Knight's Tale* of "Fortune and hire false wheel, / That noon estaat assureth to be weel" – a quotation which has stayed with me since English A-level in school since it expresses a bitter truth that we have all been obliged to taste, and on many more occasions than we would have preferred. Not for nothing is her emblematic representation a prototype of the modern roulette wheel. To be asked to believe that the supremely elusive entity of *luck* was responsible for the evolution of all the plants and species of the world is certainly a 'big ask,' and an idea which our medieval forbears (not to mention current players of the National Lottery) would have laughed out of court.

In the course of my professional life in the Humanities sector of Higher Education – an area proudly thought of as inclusive and egalitarian – it had often struck me as disturbingly contrary to that ideal that some colleagues in Science departments betrayed what appeared to me at the time to be an almost apartheid-like antipathy to philosophers. Philosophy came second only to Theology in the demonological hierarchy of some of

their number. My vague understanding of this antipathy has, however, become much clarified in the course of preparing this volume. For it is philosophers in particular who have typically been the ones responsible for calling out many 'mad genius' ideas put forward by representatives of the scientific community – a task for which said philosophers have received few thanks, needless to say – and which doubtless explains something of the animus towards them!

Hence the problem with natural selection for philosopher Anthony Flew was that it no more resembles any kind of conscious selection procedure than "Bombay duck is a species of duck".[14] It is a misnomer, a hypothesis which fails to explain what it offers to explain. It has been described as a would-be materialistic although in reality miraculous explanation:

Darwin's explanation was in its own way profoundly 'metaphysical' in that it attributed to natural selection powers that might reasonably be thought to be miraculous – that it should somehow fashion perfection from a blind, random process, and transform one class of animal into another without any empirical evidence of having done so.[15]

The only dynamic which can be fairly claimed for natural selection is the marginal, negative one of having the effect of culling unfit elements, and it is,

frankly, mendacious to impute to it the kind of creative power necessary to drive the evolutionary process forward. For *that* to occur would require a considerably more positive dynamic – or indeed a dynamic of *any* kind worthy of the name. Again, we come up against the difficulty of scientists having to impute creative powers to phenomena with no creative capacity, rather like the way in which Richard Dawkins has been criticised for (of all things!) animism in his anthropomorphic hypostatization of genes as being 'selfish' – apportioning perception and decision to inanimate entities quite incapable of *any* decision or action whatsoever, selfish or unselfish, as philosopher Mary Midgley and others have long since pointed out.[16]

Given such huge hurdles to credibility, what explanation can there then be for the albeit slow and occasionally discontinuous acceptance of Darwin's theory with all its glaring weaknesses? Many have scratched their heads over that one. In the somewhat jaundiced opinion of one of Darwin's contemporaries, the then Keeper of the British Museum's zoological collection, John Grey, it represented a regrettable inconsistency that, whilst Lamarck had been scorned in Britain for decades, Darwin came along with a theory at least reminiscent of Lamarck's and people such as Lyell and others were giving him a respectful hearing. One can understand Grey's gripe when one notes that it was only after the publication of the *Origin*, "which made

Lamarck suddenly seem a prophet rather than a throwback",[17] that Lyell was minded to withdraw his criticism of Lamarck. Was then part of the reason for Darwin's success his ability to pull strings in the upper-Middle Class old boys' network of Victorian England? He undoubtedly used his status as a Fellow of the Royal, Linnean and Geological Societies to cultivate friendships with influential members of the scientific establishment and his obsequious tone in letters to members certainly seems to have opened up some doors to him within the scientific establishment. There was also a degree of behind-the-scenes politicking carried out by Darwin and his allies to secure a favourable reception of the *Origin*.[18]

Yet I find it difficult to accept the idea, even in the toxically class-ridden society that was Victorian Britain, that Darwin's name-recognition and his belonging to the reigning in-group could have been the reason his theory was eventually accepted. A better indication may be provided by the reception of that slightly earlier book which provides a good thematic match for the *Origin,* namely Robert Chambers's *Vestiges of the Natural History of Creation* (1844), discussed in Chapter Three. Sir Charles Lyell claimed that the reason for the success of *Vestiges* lay in good part with the fact of "any theory being preferred to [...] a series of miracles, a perpetual intervention of the First Cause" (i.e. God).[19] *Mutatis mutandis,* the reason many may have welcomed Darwin's *Origin* may be sought in

the same *zeitgeist* of nineteenth-century thinking associated with the positivist philosophy of Auguste Comte. Comte's opinion that "all real science stands in radical and necessary opposition to all theology"[20] was subsequently translated into a scientific badge of honour by such scientists as Dawkins's avowed role-model, August Weismann, with his insistence that only materialist explanations could be countenanced and all else 'no-platformed'.

It appears that the ideological necessity of finding a strictly materialist theory eventually came to trump those more honest and open-minded objections voiced by the majority of early reviewers of the *Origin* in the decade after its publication. Intellectual integrity was sacrificed on the altar of ideological commitment. Natural selection was thrust forward aggressively like a form of profane crucifix to ward off the danger thought to be posed by religion in a way functionally not dissimilar to Voltaire's oft-repeated rallying cry of "Écrasez l'Infâme" (= 'crush the infamous one'; by which Voltaire meant the superstitions of religion). Darwinism was beginning to assume for some the function of an anti-religious apotropaic or magic charm against supposed evil.

On the other hand, the acceptance of Darwinism has never been universal, and the conceptually flawed and all-too assailable status of Darwinian theory brought with it the inevitable consequence of leaving the door

ajar for alternative explanations involving fewer violations of logic and probability. The competition between Darwinism and the other theories of evolution discussed above finally comes down to a simple binary: either nature, wholly in and of itself, is responsible for all the plants and animals of the world or else that same entity which we routinely term 'nature' functions as an instrumentality for another agency working *through* nature, in which case some form of Bergsonian explanation must be invoked. In the case of choosing the latter, it would be necessary to accept that the entire process of biological evolution, from the origin of life to the emergence of man, was directed from the start and that some generative programme must have been built into the cosmic script *ab initio*.

Bergson's invisible force or *élan vital* may seem vague yet we have the precedent of gravity as a force which is indubitably *there* but which we can know about only by inference. Its strength cannot be doubted even though its mainsprings and precise point of origin are unknown, as Newton himself conceded. By the same token, we can plainly observe the way an embryo grows to child and then adult stature and, since we know that this growth and maturation process cannot work by magic or a random jostling of molecules, we infer (correctly) that the growth is in response to internal imperatives imprinted within the developing infant *ab ovo*. It is these embedded biological imperatives which

accompany the person throughout life's proverbial seven ages, ceasing their agency only at the point of the person's death.

By the same token, the case for a 'cosmic designer' is circumstantial and therefore inferential, but the evidence is undeniably numerous and impressive enough to make the inference at least theoretically defensible. For without some form of inner or outer impulsion, inert *matter* – which by definition is without cognitive powers and therefore devoid of any sense of volition – could have had no inclination to create anything at all, even given infinite aeons of time. There must therefore be a cause external or internal to matter itself which is responsible for *directing* matter. What that cause *is* cannot be known in precise terms since the only pathway to apprehending it is inferential, so this may be the point to reprise the thoughts of a science professional on the subject.

The discoverer of quasars, Allan Sandage, stated:

I find it quite improbable that such order came out of chaos. There has to be some organizing principle. God to me is a mystery but is the explanation for the miracle of existence – why there is something rather than nothing.[21]

Science and theology appear to join hands at this point: Oxford theology Professor emeritus Richard Swinburne

commented that "to suppose there is a God explains why there is a physical universe at all, why animals and humans evolved".[22] Those views are compelling but in an area of enquiry in which there is a notorious dearth of certainties, equal time should also be given to the opinion that the Baconian virtue of 'nescience' should be practised, by which is meant not culpable *ignorance* but rather the honest acknowledgement that 'We do not know.' Such a practice would certainly ensure that we did not become tempted into making claims to knowledge we do not and cannot, in the nature of things, possess, and so protect us from the overreaching claims of scientism.

A similar, essentially agnostic idea was recently put forward by American philosopher, Thomas Nagel, in the course of his questioning of sundry simplistic or reductionist explanations sailing under the false flag of science. His conclusion is blunt: we are no more able to understand what Lucretius called the nature of things than could Aristotle – a contention borne out when we looked at the insoluble crux of the human brain and the subject of consciousness. The brain's fantastical degree of micro-organisation and its ability to communicate with our limbs to produce just the right movements could hardly be accounted for by a blunt process incapable of harmonising coordinating functions. In the interests of full disclosure, I have to confess that the human brain seems to me to be so ineffably complex that

I sometimes find it difficult to conceive of *any* agency being responsible for its sublime intricacies – *even a divine one*! Indeed, extending this truth-or-dare riff a trifle, I have to make the further confession that I harbour the same bafflement with regard to what possible agency could have been (ultimately) instrumental in the creation of, for instance, our family pets or the butterflies on our lawn! Hence the bathetic notion that natural selection could have played any part in creating the human brain would inevitably seem to me to point to that rather steep descent from the sublime to the ridiculous.

I am aware that persons who defend the role of natural selection in the formation of plant and sentient life on planet Earth are doing anything but 'having a laugh', but from my perspective the contention inevitably appears risible for reasons already adverted to. It is for those same reasons that I have to conclude rather bluntly, I fear, that, as far as hyperbolic fantasies about solving the mystery of life are concerned, the moral would seem to be, candidly: back to the drawing board. The beginning of wisdom in this matter is surely to acknowledge that what we are faced with is, to borrow the Chomskean distinction again, a mystery and not a (soluble) problem.

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By the very nature of things no one can know with absolute certainty how living things arose in past ages, and in actual fact, although there is a host of speculations, there is no truly scientific evidence to show how this process took place. (Philip G. Fothergill)[23]

That conclusion from one of the leading experts in the middle of the twentieth century is just as valid today. As Paul Davies comments, we can pursue rational enquiry till the cows come home but "my instinctive belief [is] that it is probably impossible for poor old *homo sapiens* to get to the bottom of it all."[24]

NOTES

1. Elsdon-Baker, *The Selfish Genius. How Richard Dawkins Rewrote Darwin's Legacy* (London: Icon, 2009), p.14.
2. On this subject see the overview in Daniel Dennett, *Darwin's Dangerous Idea*, pp.381-400.
3. Paley, *Natural Theology* p.7.
4. Lennox, *God and Stephen Hawking* (Oxford: Lion, 2010), pp.41-2.
5. Cited by Charles B, Thaxton, *The Mystery of Life's Origin*, p.12.
6. Gillespie, *Charles Darwin and the Problem of Creation*, p.125.
7. Jacques Barzun, *Darwin, Marx, Wagner. Critique of a Heritage*, revised 2nd edition, New York: Doubleday Anchor, 1958), pp.76-7.

8. Peter Atkins, *On Being. A Scientist's Exploration of the Great Questions of Existence* (Oxford: OUP, 2011), p.21
9. In Dawkins, *What is Darwinism*? (1874). Cited by Tom McIver, in *Anti-Evolution. A Reader's Guide to Writings before and after Darwin* (Baltimore and London: Johns Hopkins UP, 1992), p.115.
10. Le Fanu, *Why Us*? (London: Harper, 2009), p.58.
11. For instance, in Act 2, scene 3 of *Macbeth* Lennox says: "The night has been unruly. Where we lay, / Our chimneys were blown down and, as they say, / Lamentings heard i' th' air, strange screams of death, / And prophesying with accents terrible / Of dire combustion and confused events / New hatched to the woeful time. The obscure bird / Clamored the livelong night. Some say the Earth / Was feverous and did shake."
12. The seventeenth-century philosopher Spinoza referred to this active conception of Nature as an active *natura naturans*, whereas the more modern conception of Nature as inert and passive he termed *natura naturata*.
13. Darwin, *Origin of Species*, pp.141-2.
14. Anthony Flew, *Darwinian Evolution*, 2nd edition (New Brunswick and London: Transaction Publishers, 1997), p.25. Bombay duck is a gastronomic delicacy composed of dry, salted fish.
15. Le Fanu, *Why Us*? p.107.
16. On this point see now John Hands, *Cosmosapiens*, p.382.
17. David Knight, *Science and Spirituality*, p.95.
18. See Nancy Pearcey, 'You guys lost. Is Design a closed issue?' in William A. Dembski (editor), *Mere Creation. Science, Faith and Intelligent Design* (Downers Grove, Il: Intervarsity Press, 1998), pp.73-92.
19. Cited by Gillespie, *Charles Darwin and the Problem of Creation,* p.33.

20. Cited by Gillespie, *Charles Darwin and the Problem of Creation,* p.54.
21. Cited by John C. Lennox, *Can Science Explain Everything*? (Oxford: Zacharias Institute, 2019), p.1.
22. Cited by A N. Wilson, *Charles Darwin. Victorian Mythmaker*, p.12.
23. Fothergill, *Historical Aspects of Organic Evolution*, p.344.
24. Davies, *The Mind of God*, p.15.

SIX

PARADIGM REGAINED

I believe that one day the Darwinian myth will be ranked the greatest deceit in the history of science (Søren Løvtrup)[1]

Darwin was wrong. That was the unlooked-for conclusion to which I was inexorably drawn while writing this book (A. N. Wilson)[2]

We should not be here. Planet Earth and its welcoming biosphere is a grand cosmic anomaly. That appears to be the common view amongst many of those best placed to understand what little we can know about the world's origins and evolution. Cosmologist Sir Harold Jeffreys wrote, "I think that all suggested accounts of the origin of the solar system are subject to serious objections. The conclusion in the present state of the subject would be that the system cannot exist."[3] That a world expert can say (in terms) that he is simply flummoxed certainly has the incidental advantage of making me feel somewhat less inadequate about my inability to comprehend how *any* agency could have been responsible for the ultra-complexity of human and animal life. More substantively, however, it flags up the unanswerable

crux of how we come to be here if life really is too complex to have evolved anywhere.

In addressing that issue, one clearly has to confront a confusing amount of cognitive dissonance in the attempt to balance the paradoxical opinion that we *should not* be here with the certain knowledge that we *are* here. At this point one gains the irresistible impression of science straining beyond the limit of its proper capabilities, its efforts at understanding our place in the cosmos inadequate to the scale of the challenge confronting it. I personally for instance feel even more challenged now than I had been before researching this subject, simply because I can now make a more informed estimate of the truly intimidating impenetrability of the enigma to be resolved.

The seal was set on the possibility of any easy solution to the mystery for me by the fact that dialogues on the subject have been so vigorous for the better part of the last three centuries. These debates have been conducted by persons whose intellectual fire-power self-evidently dwarfs my own, and by such an incalculable amount that the feeling arises that, if so many persons of such luminous intelligence and ingenuity have bent their minds to solving the problem, and have come up with only the most questionable of hypotheses, then there is probably little more than can be done. We might simply have to accept that our planetary biosphere and the

origin of its denizens remain entirely resistant to rational decipherment.

When the naturalistic methods of science fail, a number of ways forward present themselves as theoretical possibilities. The first (sometimes referred to somewhat archly as the 'promissory' option) is to express the pious hope that at some time in the future its methods *will* succeed. This is the unavailing route taken by Darwin with his hoped-for fossil confirmations and by Richard Dawkins waiting for his abiogenetic miracle from the laboratory equivalent of Darwin's small, warm pond. The trouble with that option (even setting aside its obvious lameness) is that it appeals to the old canard that time and opportunity will solve all things which I, in company with many others, profoundly disbelieve for reasons indicated on a number of occasions above. The more fruitful option would be to say, "Surely *any* theory must be better than this? Where can we look next?" This would be in essence to make the plea for a Kuhnian paradigm shift – which I take to be the position of James Le Fanu when he concludes that "there must be some prodigious biological phenomenon, unknown to science, that ensures the heart, lungs, sense organs and so on are constructed to the very highest specifications of automated efficiency".[4]

That for me represents one of the most sensible suggestions I have encountered in a debate more generally marred by appeals to the most hair-raising

improbabilities. Of course, it leaves unexamined the precise modalities which might underpin the posited "prodigious biological phenomenon" invoked and does not address the question of how the phenomenon might have been triggered (Le Fanu rejects divine causation). It was observed above that, strictly speaking, attributing creatorial powers to the 'laws' (=regularities) of nature was logically incomplete without asking the further question to make the proposition logically coherent, namely, Who or What was the *legislator* behind this posited 'law' of nature?

Nevertheless, Le Fanu's idea has the great merit of being a sensibly parsimonious postulate which, being open-ended and essentially interrogative, does not go in for the kind of speculative flights associated with Darwinian theory. It opens up possibilities for future research without precluding what any results of that future research might turn out to be. I do though have one personal caveat about Le Fanu's idea that future researchers should seek the missing biological clues. This is, that it might appear more encouraging had it not been for the tireless (but fruitless) efforts already expended on that quest over the best part of three centuries; but I do not wish to counsel despair and would like to be proved wrong.

Be that as it may, such new research possibilities are for the future. At the moment we are still left with the same old conundrums. On the one hand there is that

gigantic pinball machine of the extra-terrestrial universe where everything seems to revolve around a random and apparently senseless interplay of blind and devastatingly destructive forces, all depressingly reminiscent of Macbeths "tale told by an idiot, full of sound and fury, signifying nothing". In fact, its irredeemably monolithic materiality offers an awful confirmation of the Lucretian view of the universe as an infinite riot of jostling atoms and material. Yet whereas Lucretius did at least speculate that order could issue from chaos, the cyclical swathes of purposelessness beyond our upper atmosphere give little indication of their ability to *create* anything. This is confirmed by what is coming to be known as The Great Silence, meaning the lack of extra-terrestrial life beyond our privileged abode and the realisation that all hoped-for 'signals from outer space' have proved illusory – sometimes comically so, as when one set of suspected unearthly signals turned out to be from an all-too terrestrial microwave oven.

Planet Earth, too, in its origin looks to have been little but the accidental detritus of this churning cycle of mega-destruction and yet over time, fortunately, order must have emerged from the initial cauldron-like state of our cooling planet. The new condition of habitability appears to have been facilitated by that confluence of benign forces which, although they must have their points of origin *somewhere* within the Earth's chaotic surrounds, appear, happily for us, to represent

unprecedented exceptions to the cosmic rule of chaos. Those cosmological constants appear to have become/been synchronised to permit our uniquely habitable planet. The result is that, in contrast to the truly terrifying scenes of primeval chaos and destruction surrounding us on all sides, we enjoy a planet with a rich and, to date, inexhaustible provision of resources for life.

Yet terrestrial exceptionalism in terms of climate and natural resources alone are just preconditions, inadequate on their own to account for the presence of *us*, or indeed of those other creatures great and small with whom we share the planet. So how did we all get here, given that it is unlikely that mankind came about as a result of that chemical fluke referred to as 'spontaneous generation'? The abiogenetic nostrum of water +chemicals = organic life has so clearly turned out to be a false hope (except for never-say-die hard-liners and a TV commentariate chasing ratings). Life, it appears, is not just an emergent property of chemistry, so that answers as to how we 'arrived' to reap the benefits of these bio-friendly conditions must necessarily be sought elsewhere.

The formation of a plant and animal kingdom, we can now say with a degree of certainty, has no analogue anywhere else in the sterile waste lands of our cosmic surrounds. Hence in terms of probability, the formation of a biosphere appears to border on the statistically impossible when considered against the inability of the

surrounding cosmos to initiate any form of productive creation. Excepting the beneficent effect of those constant forces which afforded the *possibility* of life, no direct, *organic* donation (remembering the panspermia *débâcle*) can be expected to have come from those quarters. Chaos is, *pace* Lucretius, not the optimal matrix from which to anticipate the production of life and order.

The possibility of a material explanation for the mystery confronting us therefore seems to be so vanishingly small that we might simply have to conclude that biogenesis was a one-off, quasi-miraculous occurrence of unknown aetiology. The present scientific failure to account for it leaves us precious little alternative than to revisit the default position of contemplating a supra-natural mode of causation. That option, which we observed philosopher Anthony Flew choosing in a previous chapter, seems to be the only conclusion which is unassailable on strictly logical grounds, however unwelcome that conclusion will strike rationalist readers, in whose number I count myself. However, it is the only conclusion which I find to be defensible as a logical inference from the vanishingly small data available. Furthermore, whilst the conclusion must in and of itself appear illogical to non-theists, that is, I submit, a separate issue irrelevant to the logical *force majeure* which drove me to said conclusion; for it was only after assessing the gross explanatory

inadequacies of all other theories that I have been forced back on the view I have eventually been obliged to adopt.

I am of course not blind to the paradox of a humanist like myself making this argument, but I would plead on my own behalf that it is a logic-driven inference (rather than a philosophic inconsistency) since it owes nothing either to mystical intuition or to the special revelation said to be vouchsafed to us in the Bible or in other foundational books of the world's major religions. It would, as I see the matter, be a betrayal of my rationalist convictions *not* to follow where the evidence leads merely in order to burnish my credentials amongst the ranks of more doctrinaire rationalists. In fact, I would make the suggestion that some of their number may need, like myself, to re-examine what the term rationality might truly consist in today with special reference to advances made in molecular biology and cosmology in the last half century. As agnostic astrophysicist Paul Davies observed, when we finally come to review an extended explanatory chain:

> *sooner or later we will have to accept something as given, whether it is God, or logic or a set of laws or some other foundation for existence* [...] *whether we call this deeper level of explanation God or something else is essentially a semantic matter.*[5]

As Anthony Flew's case shows, it is a rich irony of recent history that science, once thought to be the cause of religion's demise, has revealed unsuspected worlds of what might somewhat inadequately be termed microscopic precision engineering which goes far beyond the reach of human competence, or even of human *comprehension*. What sub-Lilliputian equivalents of the Fates of Greek mythology (one might fancifully ask) wove together all our *molecular* destinies? Biological science, once hailed, with more than a little triumphalist glee, as the universal solvent of metaphysical beliefs, is now precisely the force which is making many reassess all that we thought we knew. Time and time again above, in simply following the evidence in the direction in which I judged it led, I have been obliged by the overwhelming force of simple logic to disregard sundry shibboleths of mainstream science as well as my own prior assumptions.

It is not, however, only the discovery of a previously unsuspected microworld and its mind-baffling complexity which has triggered my rethink. A subsidiary reason is the fact that I have been alienated by no few scientists' willingness to skew evidence by abjuring the cardinal principle on which I had assumed all science must rest, namely, the absolute, unnegotiable need to provide *unbiased* evidence for any claims made. To ride roughshod over such a principle means that an idea announced as being scientific under questionable

auspices is in reality valueless and can no more lay claim to truth-status than the unsubstantiated speculations of those ancient Greek and Roman natural philosophers considered in Chapter Two. Attempts by some to instrumentalise intellectually disingenuous theories to convince us that all life has a natural and discoverable explanation has, in my own case, backfired.

The term "scientific conversion" used by Flew has not yet been properly lexicalised (Google refers you only to sundry mathematical conversion tables) but my hunch for the next decade or so is that it will become more talked-about and may even come to be accounted a paradigm shift of a limited sort. In fact, if I have any paradigm modification of my own to suggest here (or perhaps 'prophesy' would be the better word), then it will consist in people in future time being able to see through and past the Darwinian paradigm and so being prepared to start again with a fresh set of questions for biological research. Essentially, what I am gesturing towards (as a non-specialist I have no power to initiate what I advocate) is a paradigm *reversal* in the direction of the *status quo ante* before Darwin, or 'Darwin Deleted', to echo the title of Peter Bowler's counterfactual volume on this subject.

I am not in principle a great fan of counterfactuals since they depend on just the kind of speculation and conjecture which I have deprecated throughout this volume, and also because, in the event,

history often turns out to be a lot more unexpected than anybody could ever have anticipated by extrapolating from prior data. However, taking Bowler's thesis somewhat under erasure, it is still perhaps worthwhile noting his contention that

> *without Darwin's revolutionary input, evolutionism would have developed in a much less confrontational manner, preserving some aspects of the traditional vision of a purposefully designed world and adapting that vision to the modern world via the idea of progress and directed (rather than random) variation.*[6]

For instance, had Darwin never lived, it could well have been Thomas Huxley's own conceptions which achieved the greater influence, especially since the other competition, Lamarckism, could not (and did not) survive the unarguable counter-indications of Mendelian genetics;[7] plus of course Wallace would be known to have long since recanted.

Huxley thought there were "laws of form" determining how structures develop in an organism, without reference to the demands of its environment, the theory called 'orthogenesis'. On this view, species possessed characteristics unrelated to the demands of adaptation which could not have been formed by natural selection. Purely internal, biological forces propelled them along predetermined paths, and those deeper

structures were what permitted the various species to be classified in discrete groups or types by typologists such as, pre-eminently, Richard Owen. Such might have formed the conduit for Owenite ideas to have exerted a greater influence in a way which would have dovetailed with the approach advocated by Michael Denton and other Darwinian naysayers in our own day.

Of course, Darwin cannot be airbrushed out of history, but the new point of departure outlined here would, in my view, have a greater chance of making advances than would adherence to a paradigm based on Darwinian assumptions. One might hope that such a fresh approach might be the more likely to be adopted with a general raising of consciousness about the scientific conspiracy of silence which has hushed up the truth about the unfeasibility of natural selection for so long. Quite how seriously this *omertà* rule has been taken by guild members was exemplified a little while ago in an incident involving the late Stephen J. Gould of Harvard, that insider's insider to the biological world, who once referred with cynical irreverence to the lack of any convincing fossil evidence for Darwin's missing links as "the great trade secret of palaeontology".

It rapidly became clear from the enraged reactions of colleagues to this remark that, in the embattled citadel of Darwinism, no such humour could be permitted. There is a proverbial saying that there is no such thing as a joke, and many of Gould's more grim-

faced colleagues were distinctly unamused by his destructively revealing 'humour.' One cannot blame them: his cavalier disclosure had effectively holed their vessel beneath the water line. However, the ship has managed to sail on, for if any theory can lay claim to 'Teflon' status (if I may be permitted to vary the metaphor) it is that of natural selection.

An example of the resilience of Darwin's ideas even in the face of a direct frontal attack was put in evidence as early as the mid-1960s when a group of mathematicians was becoming so disturbed by the 'optimism' of evolutionists about what could be achieved by sheer chance that a conference was convened at the Philadelphia Wistar Institute in 1966 and chaired by Nobel prize winner Sir Peter Medawar, entitled Mathematical Challenges to the Theory of Evolution. In a plenary paper, Prof. Murray Eden, of MIT, showed that

> *if it required a mere six mutations to bring about an adaptive change, this would occur by chance only once in a billion years – while, if two dozen genes were involved, it would require 10,000,000,000 years, which is much longer than the age of the earth.*[8]

I would have to say that in mathematical terminology that sounds very much like a QED to me.

When challenged as to why they still hold to a discredited theory, many evolutionists to this day will reply with the statement that it is the 'best available' evidence in the absence of a superior explanation (without proper acknowledgement that best in field does not invariably equal true: 'best available' can just as often mean wrong!). They seem not to understand that such talk riles members of the general public as well as scholars in other disciplines because it relegates vital issues to the trivial status of a dons' parlour game governed by its own, in-house rules and unaccountable to any wider constituency of persons, as jurist Norman Macbeth observed a half century ago when he wrote:

I have been rather surprised to discover that many biologists dispute the propriety of a purely sceptical position. They assert that the sceptic is obligated to provide a better theory than the one he attacks. I cannot take this view seriously. If a theory conflicts with the facts or with reason, it is entitled to no respect. As T. H. Huxley long ago remarked, 'There is not a single belief that it is not a bounden duty with them [scientists] to hold with a light hand and to part with cheerfully, the moment it is proved to be contrary to any fact, great or small.' Whether a better theory is offered is irrelevant.[9]

By the same token, it has been objected that "the ID [Intelligent Design] theory makes no novel

predictions beyond the failure of evolutionary science to explain phenomena",[10] and is in that sense negative rather than constructive – but should that count against it? Surely the important role of Intelligent Design in the checks-and-balances system of the world of research scientists should be precisely to function in ways analogous to an opposition party in the political arena. In which case it should be allowed to criticise and flag up what it views to be the flaws underpinning Darwinian orthodoxy without undue harassment.[11] Honest doubt must be (and be allowed to be) foundational to the scientific method and no attempt should be made to crush or hobble it on the grounds that it does not tally with the reigning paradigm. Along with Norman Macbeth I find the 'best in field' defence both feeble and – more dangerously – misleading. It is rather as if one were to rely on anecdotal evidence in finding one's way to the train station but, after trekking miles out of one's way and suspecting that the information given had been duff, refusing to turn back and seek a better route on the grounds that the information received was the 'best available.'

If not Darwin then, who or what? Intuitively I am somewhat more drawn to non-Darwinian theories such as Bergson's which at least posit *some* driving force behind a process which otherwise would have no instrumental capability and means of forward propulsion at all. Bergson's ideas have attracted later scientists such

as Hans Driesch in the earlier part of the twentieth century and Rupert Sheldrake in the late twentieth century.[12] Bergson's idea of a vital force, encapsulated by Peter Bowler as "a spiritual force imposing a rational order on the development of life",[13] was, notwithstanding his later theistic turn, still rejected by Wallace who saw in the book's "vague ideas" "no real value as an explanation of Nature".[14] For myself too I have to say that for me Bergson's invocation of an *élan vital* seems hardly more informative than if he had used the expression 'je ne sais quoi'. For *élan vital* seems to be something of a placeholder term for what in reality seems only a vague intimation of *some* (unspecified) agency embedded within the evolutionary process.

If we are to eschew grand-sounding but ultimately vacuous cop-outs, we may just have to live with the fact that there is an order of reality which is resistant to human apprehension, and simply resolve to 'get over it.' Whether we like it or not, we are fated to remain largely uninitiated spectators of life's unexplained pageant rather than players who understand its genesis and modalities – somewhat akin to the proverbial cliché of the American tourist baffled by the rules of cricket and who remains doomed to look on in sheer bemusement. Our predicament is of course much worse than that of the fabled tourist since we cannot approach an indigenous spectator to explain the rules to us. At such moments it may be difficult to resist the

unwelcome presentiment that we might all have been press-ganged by some prank-playing cosmic joker as bit players in some dismal cosmic drama of the absurd. However, that would drive us headlong into the gloomy territory of those existentialist philosophers, novelists and dramatists, Kierkegaard, Sartre, Camus, Becket et al. – a subject which, thankfully, is beyond my present remit and around which I shall place a *cordon sanitaire*![15]

Our common bafflement about the universe we have been set to adjust to willy-nilly, all without benefit of an instruction manual, so to speak, clearly concerns external nature and the outer cosmos (which cosmologists have the grace to admit) but – less often acknowledged – it applies just as much to our own bodies and minds which work for us only thanks to the unalterable biological imperatives imprinted upon us at the very moment of our conception and into which we have been granted next to no insight. These factors enjoin upon us an involuntary state of humility – unless we take the psychologically maladaptive route of hubris by laying claim to knowledge we do not, and cannot, possess and choose to sally forth on some quasi-Faustian quest for the unknowable with all its attendant risks to our psychological well-being.

The primary and most significant existential challenge we face in our lives, it appears to me, is to stake out a delimited arena of meaning for ourselves and

contrive to seek fulfilment in that 'much in a little compass'. Otherwise, to use the proverbial nautical metaphor, we run the risk of being guided by the rock rather than by the rudder. Darwin found this out to his cost in the over two decades of torment he experienced from the time of the publication of *Origin* up to his death in 1882. When he died, he had not yet advanced to the posthumous status of the unassailable Sage of Down bestowed on him by many modern quasi-hagiographical historians of science. Hence he was made to feel all too painfully aware by St. John Mivart and others that he had not been able to satisfy many critical objections, and the very act of trying to harmonise so many scientific misgivings made his work in its sixth incarnation "a theory overburdened with inconsistencies and ambiguities".[16] He went to his grave with the unresolved tension weighing upon his shoulders like an incubus. Not for nothing has A. N. Wilson compared Darwin in older age with Hamlet.

Darwin's self-appointed nemesis, Mivart, who wrote *The Genesis of Species* (1871) in large part to oppose Darwin's ideas, was not finally able to discredit Darwin's work entirely, but it was not for lack of trying, and his unremitting sniping undoubtedly played a large part in Darwin's decision to abandon the arena of combat hurt. Darwin had no more to say publicly on the subject after the sixth and final edition of his *Origin* but in the peroration of a later work, *Animals under*

Domestication (1868), after entering the judicious caveat that the extent of the world's misery did not permit him to hold any firm belief in Providence, he nevertheless continues with a sentence suggesting that he held at least some vestige of belief (however confused) in what he termed "the interposition of the divine":

I am inclined to look at everything as resulting from designed laws, with the details, whether good or bad, left to the working out of what we may call chance [...] *But the more I think the more bewildered I become.*

Such thoughts indicate that even in later years he was never able to satisfactorily resolve the conflict in his mind between a naturalistic and a theistic understanding of the nature of things (a conflict shared by no few scientists of the modern era). He was sometimes even beset by doubts that his life's work had been based on an ill-conceived fantasy. There is in fact a somewhat disturbing parallel between Darwin in older age and Mary Shelley's figure of Victor Frankenstein, the Modern Prometheus of her subtitle. Whereas the politically radical Romantic revolutionary, Percy Bysshe Shelley, shows an understandable sympathy for that iconic representative of hubris in his lyrical drama, *Prometheus Unbound*, his wife's novel shows the negative consequences of her hero's tampering with the mysteries of creation in a way which reinforces the

moral implication of the myth as it found expression in Classical antiquity.

It will be recalled that when Prometheus stole fire from the Greek gods, Zeus punished him, *inter alia*, by creating the infamous Pandora who unleashed the evils of hard work and disease on humanity when she removed the lid of her famous box (or jar). Mary Shelley, as her subtitle makes clear, transfers the spirit of the old mythology to her own day. Her novel is often interpreted, I think rightly, as having been in part a literary riposte to the same overreaching masculinist ethos (a.k.a. hubris) displayed both by her husband and by their scientist friend, Sir Humphry Davy, who once delivered himself of this vaunting estimate of the boundless powers of science:

Science has bestowed upon mankind powers which may be called almost creative which have enabled him to change and modify the beings surrounding him, and by his experiments to interrogate nature with power, not simply as a scholar, passive and seeking only to understand her operations, but rather as a master, active with his own instruments. Who would not be ambitious of becoming acquainted with the most profound secrets of nature; of ascertaining her hidden operations and of exhibiting to man that system of knowledge which relates so intimately to their own physical and moral constitution?[17]

Frankenstein is in good part a warning against such overweening scientific arrogance.

By contrast with Darwin, Wallace was never compelled to face the older man's torments, because he had resolved the same tension in favour of the theistic alternative; and although he was inevitably the recipient of much scientific opprobrium for his tergiversation, there can be little doubt that, with his mind made up and his tensions banished, his older age was considerably happier and more productive than that of his peer. He became a respected lecturer, published widely on a broad range of topics, had a fulfilled family life and was even able to afford a substantial house just south of London which he could have only dreamed of in his impecunious youth when his father was forced to move the family from London to Usk in South Wales in order to seek relief from the heavy cost of metropolitan living. Viewed from a purely Benthamite, utilitarian perspective, it seems to be better for our collective peace of mind if, instead of baying for the moon of omniscience, we are able to get over what has been termed the "epistemological trauma" of not knowing, and simply accept the natural limitations of a common human condition commending us to honest ignorance. Macho defiance, overreaching scientism and grand-standing denials of this limitation appear to me to be not only

ludicrous but also potentially injurious to those issuing the denials.

To be sure, to practise the self-denying ordinance of curbing one's over-active imagination and hunger for solutions is easier said than done, and a compressed overview of the sequence of developments we observed from 1859 up to the present day indicates why. As human beings we all love a good mystery and are seemingly hard-wired to seek a solution to it. Much of the world's fiction exploits this human yearning to arrive at the *dénouement* in the very last pages of a novel or in the final frames of a film. For that reason, it is only natural that people have sought to understand the ultimate mystery behind the rolling out of life on earth. Few expected any (non-theistic) answer would ever be found. For long ages most thought it simply axiomatic that the answer would not and could not be found. Then two men emerged with the exciting claim that they *had* found said answer; but one later retracted his claim since it accorded so ill with the facts as he later saw them and the other spent the rest of his life racked by doubts about his own theory, doubts augmented by the criticisms of early reviewers whose objections he felt honour-bound to integrate into later versions of his eventually much diluted treatise.

So it was that, just over four decades after the first publication of the *Origin*, an eminent American biologist (Kellogg) not unreasonably pronounced the

Darwinian theory to be rejected and at the same time a substantial counter-argument was published by a French philosopher (Bergson) in a book honoured by the subsequent presentation to its author of the Nobel Prize. No less a person than Julian Huxley referred to the period 1880-1920 as that of the eclipse of Darwinism;[18] but the pull of the grand solution to the mystery of mysteries proved too strong, and upholders of the Darwinian vision would not be deterred. In the following two decades influential figures in the scientific world (including Huxley himself) scrambled to resurrect the Darwinian legacy by bringing it up to date via a 'synthesis' with Mendelian genetics, consecrating the resulting accommodation with the title of neo-Darwinism in the early 1940s.

Since that time, proponents of the overhauled doctrine have fought tooth and nail to defend it against principled objections from scientific colleagues who had begun to rumble the whole Darwinian edifice as an offence not only to best scientific practice but even to common sense. One reason that proponents are driven to defend a discredited doctrine is of course that, if you have a preconceived mind-set prompting you towards the position of anybody/thing but God (or *any* non-material explanation whatsoever), then it seems readily understandable that you will set the bar low for assessing evidence – considerably lower than if you have no preconceptions at all. Rather like Darwin's proverbial

bulldog, Thomas Huxley, who disbelieved the theory of natural selection and yet praised Darwin to the roof tops, you will rally behind *any* cause/theory which opposes a religious interpretation of the nature of things – whatever the credibility or otherwise of that theory.

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Recollecting his past life in tranquillity when he was well into his seventh decade, Darwin chose the voyage aboard the *Beagle* as the pivotal point of his career. In many ways that is true but it requires an important qualification, as Janet Browne and Michael Neve have pointed out:

Darwin was not an evolutionist during his time on board the Beagle, and it would be incorrect to say that Darwin first thought of evolution as he explored the Galapagos Islands or as he travelled home across the Pacific [...] *Darwin became intrigued by the idea of transmutation only around the middle of March 1837, some five months after the Beagle had landed in Falmouth. His travels were of course, in some important sense preparatory to arriving at this momentous decision, but the point remains that that the received image of Darwin voyaging alone through vast, turbulent seas of thought as he paced the deck of the Beagle is a fantasy: reality was very different.*[19]

The distinctive evolutionary ideas of both Darwin and Wallace did not emerge from their empirical observations as naturalists, but by applying the ideas of Thomas Malthus for their own ends. Hence for both Darwin and Wallace, natural selection was essentially an add-on which they superimposed on nature, rather than an inference they derived from nature. It has even been suggested that "Darwin did not derive his theory from nature but rather superimposed a certain philosophical world-view on nature and then spent 20 years trying to gather the facts to make it stick."[20] Essentially the modus operandi of Darwin and Wallace after their Malthusian epiphany was to develop a thought-experiment to assess what possibilities might present themselves if, bracketing off the First Cause, they asked the question: how might things have developed on the assumption that *mind* had no role to play in evolution? The answer Darwin and Wallace (for a time) came up with was that a personified 'Nature' had lain behind the evolution of the biosphere as we now know it – mindlessly and undirected; and this remains the current, albeit embattled orthodoxy despite the strongest attacks on its logical stringency and lack of empirical foundation.

However, despite frequent claims that the secrets of species evolution have been cracked for all time, the reality is that nothing posited by Darwin, Wallace or by any of the other evolutionary scientists passed in review

above has convinced me that any substantive headway has been made in penetrating the mystery surrounding the genesis and development of our terrestrial biosphere. Recent contributors to a *New Scientist* guide for young people gamely reference the old chestnuts of clay forming a prebiotic substrate at the bottom of a pond, thermal/volcanic vents, even a heavily caveated reference to 'panspermia,' but finally, I was relieved to read, they make the refreshingly honest disclosure that "we may never uncover the answer".[21] Now as before, the elephant of the creation/ evolution enigma sits as immovably in our drawing rooms as it did in 1858 and in the decades, centuries and millennia prior to that.

In this remarkable historical about-turn, the wholly unanticipated philosophic, even potentially theistic developments brought about by the critique of Intelligent Design scientists gives a form of belated vindication to two of Darwin's contemporaries thought to have been consigned to historical footnotes, namely, Harvard professor, Agassiz and Darwin's Cambridge tutor, Sedgwick. Both men thought that science's inability to explain the mystery of nature was itself evidence of the divine. Both experienced what was termed "a pious gladness" in mankind's inability to probe to nature's depths – as if God's being were somehow demonstrated by man's inability to fathom the ultimate nature of things. Both men, if I might be permitted to indulge my imagination for a moment,

could very well (posthumously!) be enjoying the last laugh.

The Materialist Paradigm: A Flawed Hypothesis?

If the universe truly is limitless, as some are beginning to speculate (or fear), then conventional mathematical notations to describe Earth's vanishingly remote statistical probability of existence in its present form would have to have so many zeros in them as to render them valueless. Given the unfathomable vastness of the ever-expanding universe, it is uncanny, even a little spooky, that a planet only 25,000 miles in circumference remains its only inhabited location. Although the Earth is thought to have emerged from the same material chaos as that which presently characterises the rest of the observable cosmos, its mysterious acquisition of a biosphere benignly pullulating with all sorts and conditions of life-forms has meant that our planet, uniquely, has been able to transcend its lifeless origins.

This singular and unimaginably improbable transcendence points to a radical incommensurability of the blue planet with any of its cosmic neighbours. Given the discontinuity between the habitable zone and the rest of an otherwise dead universe, we can hardly appeal to the analogy of our lifeless cosmic surrounds for clues in the search for an understanding of the development of

life on Earth. The fact that cosmologists can see no logical pathway (in terms of the laws of astrophysics) to our emergence inevitably leaves the matter open to the inference that we are here by dint of some past, very exceptional dispensation. Nobel Prize holder Harold Urey once issued the challenging brain-teaser that life is "too complex to have evolved anywhere". That gnomic statement having been once decrypted, however, his bottom line becomes abundantly clear: the biosphere will not remit to any purely scientific mode of explanation. In this conclusion biologist Urey shows himself at one with the verdict of cosmologist colleagues.

Conclusions adducing a wholly natural causation of the biosphere, on the other hand, tend to be skewed by an undiscriminating lumping together of the Earth with the rest of the cosmos. Such an analogy is misleading since there can be no comparison between life and non-life. One is simply not comparing like with like, and there is little justification for the collocation. We seem to represent a cosmic exception so singular as to require a separate form of explanation altogether from the rest of the cosmos. From this, I would argue, it is difficult *not* to deduce that we must be dependent on special dispensation, for no alternative logical pathway presents itself. To suggest otherwise would seem to betray a form of ideological resistance and denial which, I suspect, lurks behind many attempts to postulate a purely material genesis for our biosphere.

Little help, then, can be anticipated from the application of what is termed methodological naturalism (i.e. accepting only material explanations as a matter of unnegotiable principle) in answering the question of how the happy conjunction of habitability-plus-inhabitants came about. Science works admirably well within its proper domain but offers little help when tasked to go beyond those sharply delimited confines. This point has already been conceded by cosmologists who have concluded with refreshing candour that, according to the standard laws of physics, we 'cannot be here'– an unvarnished, no-nonsense verdict which commands respect since it does not pretend to knowledge beyond its reach and does not attempt to obstruct or preclude any more potentially enlightening cosmological advances in future time. In stark contrast to such admirable shows of candour, many biological scientists, through their attempts to artificially shoehorn all available evidence into a Procrustean, quasi-Malthusian schema of natural selection, have been responsible for those many disingenuous reasonings, cognitive dissonances and, frankly, credulities which have afflicted biologists from the time of Darwin down to our own day.

Far better and more credible in my view, to 'stop digging' than to continue to prop up implausible theories in ways which are not only offensive to the empirical principles of good science but also potentially obstructive to any future research conducted under the

aegis of a modified paradigm. There is such a thing as 'trying too hard' in the attempt to explain the inexplicable – a procedure which commonly brings only ridicule down upon the would-be explicator. As Robert Shapiro commented, "Some theories come labelled as The Answer. As such they are more properly classified as mythology or religion than as science."[22]

Rigid adherence to such theories in defiance of reasonably presented counter-indications also runs the risk of losing public credibility and trust. In the interests of keeping faith with members of the public outside the professional science guild, it might be preferable if biological specialists would consider the fact that they owe it to the lay majority to come clean about their ignorance of or even ambivalence about baffling phenomena which we must *all* attempt to come to terms with in order to figure out (if humanly possible!) our place in a bewildering universe. Having to make profound existential choices about the values and beliefs we choose on the basis of half-truths and even studied obfuscations can clearly do the general public no good. A best practice based on the principle of straight candour is surely indicated, if only because, faced with life's imponderables, biological specialists and lay persons alike find themselves perforce in the same existential boat.

If the reigning materialist paradigm had even a tolerably convincing weight of evidence behind it, I

would be the first to accept it. In fact, I would embrace it wholeheartedly and with a sense of relief, even closure, since it would provide an excellent fit with a prior educational formation which has habitually foregrounded rational, evidence-based criteria. However, it is those very rationalist principles which bid me reject the Darwinian narrative. I find it the grandest historical irony that the most fervent defenders of Darwinism claim to be advancing the ideals of the European Enlightenment. My view is that they are in reality dishonouring the foundational principles of that admirable project by perpetuating a hypothesis without empirical foundation or even the slightest approximation to verisimilitude. The case might even be made that the Darwinian narrative can work only by implicitly disregarding the Enlightenment programme through its appeal to ways of thought supposed to have died out countless centuries before Darwin was even born. By which I mean that to attribute creative potential to Nature itself is a deeply archaic, animistic way of thinking which takes us back even beyond the time of monotheism to the Homeric age and before that to the pre-Biblical world of ancient Mesopotamia. This particular objection to Darwinism has not been specifically adverted to in the numerous publications I have sampled, yet it bears genuine relevance to the debate.

In the imaginative works of those early eras, Nature through its many deified incarnations is routinely credited with directive capability. Zeus, called The Thunderer by the poet Hesiod in his *Theogony*, was believed to be able, *inter alia*, to control the weather; Demeter, the fertility goddess, could exert an influence on the annual crop yield; Aeolus, Keeper of the Winds in the *Odyssey*, provides a gentle breeze to waft Odysseus back to Ithaca after his long travels. To the ancient Greeks and many peoples who preceded them, the gods were essentially personifications of different aspects of Nature itself. The pre-scientific mind imputed agency to Nature by way of the personification of Nature's various aspects as individual divinities.

Curiously, Darwin's theory of natural selection, although it struck most at the time and even since as an intellectual innovation, appears in reality to be something of a throw-back to those earlier modes of thought. In what seems to be a confirmation of the 'nothing new under the sun' adage, Darwin appears, wittingly or not, to have 'channelled' the spirit of the older, polytheistic world by crediting Nature with an infinite number of transformative powers. This was in fact pointed out by Bishop Wilberforce when he arraigned Darwin for making of natural selection an 'impersonal deity.'

The equation of Nature with divine forces was a phenomenon well understood by pre-scientific

communities, but it is a mental world which we supposedly lost countless centuries ago and, on the face of it, it would carry little credibility today to impute human-like agency to any aspect of external nature. That Shakespeare still retained a feeling for such thought-ways is evident in his deployment of the dramatic technique of pathetic fallacy. Even in the England of circa 1600, however, I suspect that the supremely versatile dramatist may have been giving poetic expression to an obsolescent belief. Yet whatever the precise phenomenological status of Nature might have been in the minds of our Elizabethan forbears, there can be little dispute that in the third decade of the twenty-first century, despite our ready ability to warm to Shakespearean pathetic fallacy as a marvellous poetic device, we no longer understand it literally and viscerally as a logic relevant to our own lives (unless we are of a particularly mystical bent).

If, then, we no longer believe Nature to possess power in the way familiar to many ancient Greeks, Mesopotamians and perhaps some Elizabethans, natural selection can only appear as an outmoded postulate void of instrumental capability. Since Nature is no longer thought to contain the directive force of any immanent divinity, it might now seem (picking up on my earlier analogy) to be functionally as powerless as an inert metal chassis without an engine. To claim that such an unpowered vehicle, so far from being doomed to

everlasting stasis, could have been the driver of all those vast transmutations responsible for populating the earth in all its diverse profusion must necessarily appear unconvincing. In fact, the idea might appear incomprehensible by the light of those rational criteria used by citizens of the post-Enlightenment age to gain a handle on the world we live in.

The idea of any selection procedure initiated and implemented by unaided Nature as a posited solution to the mystery of speciation falls at every hurdle. It lacks explanatory force, empirical foundation and logical coherence. It postulates the contradiction-in-terms of a metamorphosizing, species-creating dynamic issuing from a process lacking any discernible dynamic. It is ultimately a pseudo-explanation, a way of concealing underlying ignorance, as philosopher Richard Spilsbury once noted,

The basic objection to neo-Darwinism is not that it is speculative, but that it confers miraculous powers on inappropriate agents. In essence, it is an attempt to supernaturalize nature, to endow unthinking processes with more-than-human powers.[23]

So unconvincing must this archaic thought-pattern seem to the modern, scientifically literate mind (one would have thought!) that the unintended consequence of its failure to persuade can only be to

reinforce the alternative position of divine causation. This, of course, is precisely the option rejected by countless atheists and agnostics in the post-Enlightenment centuries, with the result that such persons must necessarily find themselves stranded between the devil and the deep blue sea when faced with their unenviable choice. However that matter may be, the default position must by definition entail the acceptance that sentient life could not have developed without some form of foresight and an accompanying instrumental power to realise that vision in practice. This must point us away from Nature in the direction of an unknown (and unknowable) source of intelligence outside Nature, and, to judge from the sublime intricacies and spellbinding wonders in which our world abounds, a supra-human form of intelligence at that.

The genesis and evolution of the biosphere must in the end come down to a clear binary: either Nature did the selecting or God did (however that latter entity may be conceived and glossed). To say that 'God did it' obviously does not sit well with people holding a non-theistic world-view. To say that 'Nature did it' arguably carries even less plausibility, so that many persons may feel themselves torn between two equally improbable positions. However, with the natural, materialist alternative having failed so signally, we are left with no other choice but to consider the possibility of the 'God hypothesis.' Faced with the sheer unfeasibility of a

purely natural explanation, logic leaves us with little other choice. Extending the old adage that nothing comes of nothing, it might be contended that in real life, in contradistinction to magical stage performances where the proverbial rabbit emerges from under the hat, nothing can 'magically emerge' or 'naturally evolve' without a supporting dynamic – little though we can know of what that originating 'dynamic' might have looked like or consisted in. In default of a better explanation than that offered by the Darwinian paradigm, however, this hypothesis surely cannot be discounted out of hand.

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Ultimately, I guess I am entering a plea to call a halt to the interminable proxy wars which have led to inadequately informed support for an unworkable theory simply because it purports to give a satisfactorily secular explanation of things. My request to biology specialists is that they liberate this whole subject from the toils of ideology and adopt a neutralist stance by simply assessing the evidence as it stands. I cannot deny that it would be profoundly satisfying to be put in possession of The Answer, but Darwinian theory fails to provide that answer and sounds suspiciously to me like whistling in the wind in the teeth of a dearth of evidence. Whilst there may exist some entirely natural solution to the

problem, it is not in my mind the one provided by Darwinian theory. It is of course theoretically possible that a future discovery may shed light on this issue. Until such a time should arrive, however, I think it better we not delude ourselves that we have any inkling of what lies behind the genesis and evolution of our unique planet's plant and animal life.

NOTES

1. Løvtrup, *Darwinism. The Refutation of a Myth* (London: Croom Helm, 1987), p.422.
2. Wilson, *Charles Darwin, Victorian Mythmaker*, p.1.
3. Jeffreys, *The Earth: its Origin, History and Physical Constitution* (Cambridge: CUP, 2008), p.359.
4. Le Fanu, *Why Us*? p.122.
5. Davies, *The Mind of God*, pp.15,16.
6. Bowler, *Darwin Deleted*, p.276.
7. Neo-Darwinism emerged as the 'winner' after Mendelian genetics disproved Lamarck's theory that acquired characteristics could be passed down to future generations.
8. Cited by Gordon Rattray Taylor, *The Great Evolution Mystery* (London: Secker and Warburg, 1983), pp.4-5.
9. Macbeth, *Darwin Retried*, pp.6-7.
10. Thomas Dixon, *Science and Religion. A Very Short Introduction* (Oxford: OUP, 2008), p.98.
11. Scientists' pulling of rank and obstructiveness towards non-standard thinking is not a point I wish to foreground here since I deem distracting *personalia* irrelevant to the main issue, but interested persons may consult Richard Milton's *Shattering the Myths of Darwinism*, especially

pp.265-272 and *Heretic. One Scientist's Journey from Darwin to Design* by Matti Leisola and Jonathan Witt (Seattle: Discovery Institute, 2018).

12. For an overview of these developments see Oliver Robinson, *Paths between Head and Heart. Exploring the Harmonies of Science and Spirituality* (Winchester and Washington: O Books, 2018), pp.157-61.

13. Bowler, *The Eclipse of Darwinism* (Baltimore: Johns Hopkins UP, 1983), p.57.

14. Michael M. Flannery, *Alfred Russell Wallace. A Rediscovered Life* (Seattle: Discovery Institute Press, 2011), p.110.

15. For an accessible sampler on this subject see Theodore Dalrymple and Kenneth Francis, *The Terror of Existence from Ecclesiastes to the Theatre of the Absurd* (London: New English Review Press, 2018).

16. Peter J. Vorzimmer, *Charles Darwin. The Years of Controversy. The Origin of Species and its Critics* 1859-1882 (London: University of London UP, 1972), p.224.

17. Cited by Maurice Hindle in his Introduction to Mary Shelley's *Frankenstein*, pp.xxix-xxx.

18. On this subject see Peter Bowler, *The Eclipse of Darwinism. Anti- Darwinian Evolution Theory in the Decades around 1900*, 2nd edition (Baltimore: Johns Hopkins UP, 1992).

19. *Voyage of the Beagle. Charles Darwin's Journal of Researches*, edited by Janet Browne and Michael Neve (London: Penguin, 1989), p.2.

20. Charles Thaxton, 'Introduction' to *The Intellectuals Speak out about God*, edited by Roy A. Varghese (Chicago: Regnery Gateway, 1984), pp. 1-15, here p.6.

21. David Cromwell and others, *This is Planet Earth. Your Guide to the World we Live in* (London: John Murray, 2018), p.175.

22. Shapiro, *Origins. A Skeptic's Guide to the Creation of Life on Earth* (New York: Bantam, 1987), p.13.
23. Spilsbury, *Providence Lost*, p.19.

EPILOGUE

When my wife and I visit rural Brittany, one of our favourite ports of call is a lovely coastal church called St. Jean du Doigt (Saint John of the Finger), where the eponymous digit of the apostle is popularly supposed to be stored. For us this quaint belief adds to the unspoiled charm of the Breton countryside. Historically the medieval practice of collecting saints' relics is now of commonly understood as a form of 'pious fraud' since it is all-too apparent that relic-mongering in the Middle Ages was used to buttress the power and influence of the Catholic Church. By the same token, the instrumentalization of an unverifiable, non-evidence-based hypothesis to prop up today's secular ideology presents a telling mirror image of the medieval practice. Given the secularising *volte-face* experienced in post-Christian Europe, an important motive for giving such an easy pass to the quasi-magical notion of natural selection seems to be the desire to deter people from entertaining any notion of divine creation.

The medieval Church's dubious but very successful method of impressing its congregants with its ancient pedigree and spiritual power is matched by today's attempts to persuade people of a materialist explanation for life by the disturbing practice of blinding them with unverifiable science. If anything, this modern

form of hoodwinking seems less forgivable than its medieval variant since it is so out of line with the values of the 'age of the masses' (to borrow the title of Michael Biddiss's classic), an age of universal suffrage and democracy where each individual has the right to make up his or her mind. To allow and abet a deception to be practised upon people in the attempt to prevent them making up their own minds about something as fundamental as their preferred existential position in life is to my mind as misguided and paternalistic a practice as any perpetrated by the medieval Church.

It is now half a human life-time since Michael Denton blew the whistle on Darwin in the loudest yet most well-informed terms to date, and yet *nothing has happened.* School text books are still purveying the same Darwinian interpretation of life; Richard Dawkins was recently given a very easy ride by Marc Urban on BBC's Newsnight programme (19.9.2019); and in the teeth of all empirical evidence to the contrary, Darwinism has become accepted as the most grown-up form of understanding of mankind's existential status by the many who, I suspect, have had little time or opportunity to check up on the truth or otherwise of the propositions they are buying into. This acceptance seems over time to have become a wholly unexamined assumption – which may explain why many have rolled over so easily to accept what are essentially the unproven speculations of a nineteenth-century natural philosopher.

However, not all have been so unenquiring or supine, and Richard Dawkins has even been stung to lament the fact that outsiders have presumed to question the assumptions of biology specialists whereas they disregard completely what goes on in other branches of science such as, say, quantum theory. The reason for this is of course (as he must surely know) that his particular discipline holds such vast implications for the existential situation of all men and women, for the very "ground of their being", that many quite rightly find it impossible to ignore. If nothing else has been achieved in this short volume, I hope by presenting views which differ from current orthodoxy to have given readers the chance to reflect with me on the many problematical facets of this topic. My own position, as a long-standing humanist with no allegiance to any revealed faith, remains that we each have to come to terms with an inscrutable universe in the best (and most morally accountable) way we can. Others should be free to come to their own conclusions (*whatever* they may be) on an issue in which there are no truth-bearers, only truth-seekers, in whose number I very much (still) count myself.

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The author, a committed humanist and a senior academic, reveals the deep origins of Charles Darwin's ideas and scrutinises Darwinism from the viewpoint of scientific methodology. Responses to Darwin's theory of Evolution are charted from the nineteenth century to this day, providing a balanced assessment of the arguments of supporters of Intelligent Design and Darwinian Evolutionism, in particular (but not only) Richard Dawkins and Anthony Flew. The unexpected conclusion: Darwinism is a philosophical construct with its roots in Classical Antiquity - not science.

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