



ORDER: GOD'S, MAN'S AND NATURE'S

DARWIN ON LAW AND ORDER – AND GOD

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For those accustomed to thinking of Darwin as the iconic scientific naturalist, it can come as a surprise to read what he understood by *nature*. By “nature”, he once wrote, “I mean the laws ordained by God to govern the universe.” This was in his big species book, on which he was working before the diversion that led to his *Origin of Species*. In the *Origin* itself the laws of nature still presuppose a legislator: Darwin wrote of “laws impressed on matter by the Creator”. In the aftermath of publication he would even use the phrase “designed laws”, as in his private correspondence with the Harvard botanist Asa Gray. In May 1860 Darwin told Gray that he could see no reason why a man, or other animal, “may not have been aboriginally produced by other laws; and that all these laws may have been expressly designed by an omniscient Creator, who foresaw every future event and consequence”.

It can be tempting to dismiss Darwin's theistic remarks as merely expedient; but one has to think twice before adopting that view. Indeed there is a passage in his *Autobiography* that comes close to refuting it. He is referring to a source of conviction in the existence of God that is connected with reason and not with feelings. This follows, he wrote, “from 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.” This conclusion, he adds, was “strong in my mind about the time, as far as I can remember, when I wrote the *Origin of Species*.” He does, however, also add that since that time the conviction has “very gradually with many fluctuations become weaker”. Darwin's graduation from a Christian theism to the agnosticism of his old

age has, of course, been well documented. In this paper, I want to focus on the specific issue of the governance of nature and the strains to which his theistic gloss was subjected.

The law metaphor within theology

The image of “laws impressed on matter by the deity” had featured prominently in religious discourse during the Enlightenment and among Darwin’s contemporaries. It was an attractive trope because it allowed the governance of the world to be under the simultaneous jurisdiction of natural laws and a transcendent divine power. We should not underestimate the benefits to theology. Regularity and uniformity in nature could testify to the fidelity of the Creator. The universality of nature’s laws, with gravitation as a prime example, could reinforce belief in the unity of both creation and its Creator. The simplicity and elegance of the laws might reflect something of the character of God. In Cambridge, at the very time Darwin was studying there, William Whewell was arguing for the existence of an intelligent Creator not only from the elegance and function of individual laws but also from the beneficent consequences of their aggregate action.

From within Christian theology there was another dimension to such discourse. If laws are construed within a theistic metaphysics they need not be regarded as so fixed that a sovereign deity need be constrained by them. That at least was the position taken by Newton and his spokesman Samuel Clarke. When Leibniz famously objected to Newton’s proposal that a divine initiative might be necessary to maintain the stability of planetary orbits, he accused his rival of peddling a send-rate deity. The resulting controversy exposed a gap between a theology of nature that stressed divine rationality in creating the best of all *possible* worlds and one that rather stressed the primacy of the divine will in creating a world of choice that might have been otherwise. Which side one took could affect one’s understanding of the order of nature; but on the voluntarist view there was a sense in which the laws were not incorrigibly fixed. This was because, as Clarke put it: what is commonly called the course of nature is “nothing else but the will of God producing certain effects in a continued, regular, constant, and uniform manner”. But that was without prejudice to the possibility that God might act in other ways. Newton himself, in Query 31 of his *Opticks*, saw no contradiction in the view that God could “vary the laws of nature, and make worlds of several sorts in several parts of the universe”.

In short, a philosophy of science that privileged explanation by means of natural *laws* put few constraints on theological reflection. This is clear from statements made by the two most prominent philosophers of science of Darwin's day: William Whewell and John Herschel. In his *Bridgewater Treatise* Whewell affirmed that:

God is the author and governor of the universe through the laws which he has given to its parts, the properties which he has impressed upon its constituent elements: these laws and properties are ... the instruments with which he works ... through these attributes thus exercised, the creator of all, shapes, moves, sustains and guides the visible creation.

Explanations premised on the properties of matter did not preclude explanations based on the laws that described their agency. For Herschel, too, the efficacy of nature's laws required reference to "intelligent direction".

A fissure and an ambiguity

There was, however, an alternative way of reading the laws of nature and the design they were thought to enshrine. Among the deists and rationalists of the 18th century, among those suspicious of uncritical appeals to revelation, one finds the image of nature as a predetermined mechanistic structure with little or no room for a continuing active providence. Joseph Priestley would be an extreme exponent of this completely deterministic worldview. In his own words:

there will be a necessary connexion between all things past, present and to come, in the way of proper cause and effect, as much in the intellectual, as in the natural world; so that ... according to the established laws of nature, no event could have been otherwise than it has been, is, or is to be, and therefore all things past, present and to come, are precisely what the Author of nature really intended them to be, and has made provision for.

Within the discourse of natural theology there was, therefore, a fissure between theistic and deistic attitudes to the laws of nature. Did they have their own autonomy once established, or did they imply, as they did for Herschel and Whewell the supplementary activity of a being who sustained them? In either case the vocabulary was the same: nature is governed by laws established by a Creator. But the fissure created an ambiguity, which could be resolved only if authors made additional statements about their respective positions. A similar ambiguity applied to statements about design in nature. I have argued elsewhere that the ambiguity could

sometimes be useful to scientists seeking to allay suspicions about their religious heterodoxy; and this was to be true of Darwin. His references to a Creator who created by laws allowed him to say in the second edition of the *Origin* that he could see “no good reason why the views given in this volume should shock the religious feelings of any one.”

So we come now to the question of Darwin’s thinking about religion and how it changed over time.

Darwin and the legislative role of a Creator.

Given the additional ambiguities that reside in the word “creation”, it should come as no surprise that Darwin held several different conceptions of a “Creator” during the course of his life. None of these could be called “creationist” in the manner of modern creationism. As a student in Cambridge, expecting to become a priest in the Anglican Church, Darwin aligned himself with orthodox Christianity. He probably still believed that living things were the result of specific acts of creation. He tells us that at this time he took the bible seriously, certainly as a guide to moral virtue. The Creator he found in William Paley’s *Natural Theology* (1802) was a Creator inferred from the unity of creation and from the evidence of design in the contrivances of nature.

Darwin did gradually reject the Creator of Christian orthodoxy, for reasons that have often been rehearsed. But Darwin’s departure from Christianity was a long slow process and it did not stop him from using the word Creator in a second sense. Long after he had developed his theory of natural selection he would still refer to a Creator who had “breathed life” into a primordial form (or forms), from which all other living things had descended. The metaphor was still biblical, but this was not a Creator who had created every species separately. During the 1860s Darwin claimed in a letter to Joseph Hooker that he regretted having used biblical language in this context. He may have felt that it implied too much about his personal beliefs; but his regret also reflected the fact that his choice of language had given an opening to scientific critics, such as Richard Owen, to complain that his theory was *insufficiently* naturalistic. Whatever the reason, Darwin’s retention of this role for a Creator, made more explicit in the last paragraph of the *Origin*’s second edition, helped sympathetic religious commentators to adjust to his science.

A third conception of the Creator was more firmly held by Darwin at the time he wrote the *Origin*. This was close to the deistic conception to which I have already referred. Here a Creator was assumed when considering why there should be an ordered universe at all. Darwin's preference for a God who "creates by laws" dates at least as far back as the transmutation notebooks of the late 1830s. Even then he could be severely critical of explanations of living structures that invoked the will of the deity, about which (he says) we know nothing. But he was caught in something of a dilemma. The deism in which divine activity was exclusively concentrated in an original act of Creation comfortably sat with a fully deterministic, essentially unchanging universe for which mechanical analogues were appropriate. By the time his theory was in print, Darwin was struggling to find a formula that did justice both to the order of nature and its propensity for novelty. Perhaps living things *were* the result of "designed laws with the details left to chance", though he confessed to Asa Gray that not even this formulation really satisfied him. At one level he clearly had a consistent position in 1859 and 1860. Acts of creation from an intervening deity were not needed in order to understand fossil sequences, the diversification and geographical distribution of species. At the same time, the word "creation" still had meaning when reserved for the ultimate origin of the universe and the laws that had made possible what Darwin described as the "highest good, which we can conceive, the creation of the higher animals".

As Darwin became increasingly agnostic about references to a deity, the Creator behind this creative process became more remote. Evidence of this particular shift occurs in the fifth edition of the *Origin* where, referring to the first primordial form, Darwin replaced "was created" with "appeared on the stage". His agnosticism was subtle. He could still articulate the conviction that this "wonderful universe" cannot be the result of completely impersonal forces; but if the human mind was itself the product of evolution, could it be trusted on such metaphysical questions? In this agnostic mode, Darwin confessed that his judgment often fluctuated. He claimed that he had never been an atheist, but his earlier convictions about a Creator who had impressed laws on matter had evidently been subjected to strain.

What were the strains?

We often find in the literature one of two extreme positions. Either it is simply assumed that it was Darwin's science that was the prime mover for his agnosticism. Or, in complete contrast, it is asserted that it was his loss of a Christian faith that

made possible his radical science. In a contribution to the *Harvard Magazine* E. O. Wilson presented the choice in precisely these stark terms. He wrote:

The great naturalist did not abandon Abrahamic and other religious dogmas because of his discovery of evolution by natural selection, as one might reasonably suppose. The reverse occurred. The shedding of blind faith gave him the intellectual fearlessness to explore human evolution wherever logic and evidence took him.

It is good to have a popular misconception corrected. But are these alternatives the only possibilities? Surely a more subtle analysis is necessary. It is true that Darwin's rejection of Christianity had other roots than scientific theory. One was his moral revolt against the doctrine of eternal damnation for those (and this would have included his father and brother) who were outside the fold of Christian believers. His doubts concerning the authenticity of revelation did not require scientific support. But it would be misleading to dissociate his personal religious trajectory from his work as an astute observer of nature in the broadest sense. The many facets of a struggle for existence that he observed during the Beagle voyage challenged the aphorism of William Paley that it is a happy world after all. Not if you have just experienced an earthquake or witnessed at first hand the savagery of what Tennyson would describe as "nature red in tooth and claw". During the voyage Darwin's studious observation of the Fuegians caused him to question what he had been told by his cousin, Hensleigh Wedgwood – that what differentiated man from animal was an innate sense of God that was universal in humans. Among the Fuegians, Darwin could detect no worship of, nor even a word for, God. Even before their marriage his cousin, Emma, worried that the critical, sceptical mentality necessary for constructive science might corrode his faith.

Another problem with Wilson's structuring of alternatives is that some of Darwin's deepest reflections involved both scientific and religious considerations simultaneously. For example, with its images of warfare within nature, Darwin's science highlighted the theological problem of pain and suffering. He once wrote that the existence of so *much* pain and suffering in the world seemed to him one of the strongest arguments against belief in a beneficent deity; but, in the selfsame sentence, he continued that it "accords well with my theory of natural selection". In a recent essay the philosopher of religion, Peter van Inwagen has volunteered a surprisingly succinct argument for compatibility between Darwinism and the assertion

of God's existence. If God is omnipotent (as God *is* by definition) then God could create any world, including a Darwinian world. Why then, he asks, "should someone who thinks that the actual world is a Darwinian world regard that feature of the actual world as demonstrating that – as having even any tendency to show that – there is no God?" If there is anything having that tendency it is the "immense amount of suffering the world contains"; but this, he insists, is not a discovery of science. The problem is that, in respect of magnitude, it was. The long, tortuous, bloodstained trail of evolution was staggering to Darwin as his science disclosed, and had to explain, massive extinction.

Connecting the laws of nature to their putatively divine origin was also placed under strain by features of nature that needed neither sophisticated science nor sophisticated theology to read them. These were the gruesome features that deeply offended his aesthetic sensibilities. How could the ichneumon wasp be the product of benevolent design when it laid its eggs in the bodies of caterpillars that were then devoured by the hatching grubs? Was there not something devilish in such a phenomenon?

These are just a few of the considerations that we know weighed with Darwin when thinking theologically about the laws of nature. They undoubtedly put the traditional trope under strain. Two other considerations magnified the problems. Both the incidence of variation and the operation of natural selection put the spotlight on contingencies that seemed to tell against the tight governance of nature. That was certainly how Darwin's theory was perceived by many of his contemporaries, including John Herschel whom he so greatly respected. Herschel dismayed Darwin by describing natural selection as the "law of higgledy-piggledy". Hardly complimentary! As David Hull has observed, Herschel did not object to Darwin's introduction of secondary laws, but to the character of the secondary laws he introduced. The nub of the problem was that variations appeared randomly, directionless in relation to any prospective use. For Herschel the word "law" had the connotations of a plan, without which it was an inappropriate term. There had to be an "intelligence, guided by a purpose" and "continually in action to bias the directions of the steps of change – to regulate their amount – to limit their divergence – and to continue them in a definite course." Asa Gray would have the same objection, insisting on a form of divine governance that led the variations in propitious directions.

But Darwin could not see it. He addressed the problem of directionless variation in the concluding paragraphs of his 1868 work *The Variation of Animals and Plants under Domestication*. Here he singled out Gray for criticism. The discussion is, however, framed in an interesting way that tells us more about Darwin's agnosticism. In one respect variations were not accidental. They resulted from events obeying natural laws, even though the laws may not be known. But in the critical respect of their prospective use to the organism they were accidental, and far more often injurious than beneficial to the creatures themselves. There is, Darwin says, a "great difficulty". It arises from examining the consequences of assuming that each particular variation was pre-ordained from the beginning of time. If this was the case then the laws of nature with which he has been concerned must surely appear superfluous? As he puts it:

that plasticity of organisation, which leads to many injurious deviations of structure, as well as the redundant power of reproduction which inevitably leads to a struggle for existence, and, as a consequence, to the natural selection or the survival of the fittest, must appear to us superfluous laws of nature.

A preordained, determinate universe in which streams of propitious variation were pre-programmed would effectively by-pass his science. On the other hand, he acknowledges that a Creator who can be described as omnipotent and omniscient "ordains everything and foresees everything". Thus, he concludes, "we are brought face to face with a difficulty as insoluble as is that of free will and predestination." Here was a favourite justification for Darwin's belief that there were problems beyond the power of the human intellect. What kind of governance of the world allows for both free will and determinism? What kind of governance of the world allows for both the unpredictable aggregate action of Darwin's laws and for the ultimate ordainment of a prescient deity? For religious thinkers the problem has not gone away.

Naturalising the law metaphor

As Darwin became increasingly agnostic, what interpretation did he place on "laws of nature"? I suspect that because he was willing to use the word *law* informally, even loosely, to convey the sense of an ordered structure to nature, it would be possible to identify several overlapping meanings in his writings, with more or less continuity between them in successive works. But I think there is perhaps a shift from the period before the *Origin* when the word *law* still had theological connotations, to a later period when it had largely lost them. In the *Origin* itself a whole chapter is

devoted to the “Laws of Variation”, even while acknowledging a profound ignorance of them. Inheritance is governed by laws, as is embryological development. In the chapter on variation, the “same laws” appear to have acted in producing the lesser differences between varieties of the same species, and the greater differences between species of the same genus. Even the effect of external conditions of life on variability, and the effect of use and disuse, are dignified with the word *law*. At the same time this vocabulary of law does not appear to translate precisely into Darwin’s methodology. In terms of what is practically possible, Darwin looks for what he calls *rules* “of high generality”. These would include such inductive inferences as the rule that “parts developed in an unusual manner are highly variable” or the rule that “specific characters” are “more variable than generic”. Even the action of natural selection is subsumed under what Darwin calls a “more general principle” – namely that “natural selection is continually trying to economise in every part of the organism”. Yet in the metaphysics behind this modest pursuit of general rules or principles, there are laws of which we are ignorant that govern causes of which we are ignorant. In this metaphysics where laws are given the power to produce effects there is, I think, a legacy of the natural theology, which from the late 1830s he had been seeking to reform. The point has been well made by David Kohn:

Time and again, while damning the narrowness of special creation, and by direct implication providential theology, [Darwin] appeals to a higher, nobler, more enlarged and enlightened theological perspective. For Darwin, in the *Origin*, the laws of nature implied that there was order in the universe...But his open position was not that of an atheist. He can say the laws of nature are impressed on matter by a Creator ... God was an implication of nature’s order. And evolution by natural selection was an explanation of natural order that the highest, honest, religious mind ought not despise.

The powers inherent in nature had been invested by the Creator. In his earlier Essay of 1844, the natural theology had been even more explicit: “laws capable of creating individual organisms ... should exalt our notion of the power of the omniscient Creator.”

By contrast, on later occasions Darwin defines laws of nature in a more Humean way that seems to denude them of power. Is it the more agnostic Darwin speaking when he declares that “I mean by nature only the aggregate action and product of many natural laws, - and by laws only the ascertained sequence of events”? This was Darwin in 1868, in the opening pages of *The Variation of Animals and Plants under*

Domestication. Quite a lot would seem to hang on the word “only”. It occurs twice in the above sentence. In the chapter on natural selection in the third edition of the *Origin*, Darwin had already construed laws as “the sequence of events ascertained by us”, though without that emphatic, second “only”. It is true that when Darwin slipped into this definition it was usually to fend off the criticism that he had personified, even deified, natural selection itself. But if laws are *only* sequences ascertained by us, whence derives their potency? This was actually Herschel’s concern when he reacted to Darwin’s philosophy of nature. Herschel was perfectly willing to construe sequences as “laws” but only if something was added. Without the “necessity of intelligent direction”, Herschel objected, “we are unable to conceive how the law can have led to the results.” His grievance was that Darwin had omitted this element in the enunciation of his laws.

If laws merely describe ascertained sequences of events, there is also the question of predictability. A question here might be whether for Darwin the unpredictability of nature arises from some inherent inadequacy in attempts to explain the real world through the vehicle of artificially idealised laws; or whether it simply arises from our ignorance of nature’s complexity. Interestingly, there were contexts in which he exploited the fact of unpredictability to make a critical point about complexity. For example, he wants to say that the degree of adaptation of species to the climates under which they live is “often overrated”. This may be inferred, he suggests, from our “frequent inability to predict whether or not an imported plant will endure our climate, and from the number of plants and animals brought from warmer countries which here enjoy good health.” A nice reminder that in the governance of this planet human actions have latterly complemented the action of nature’s laws.

How is nature governed?

Darwin became very clear on how nature is *not* governed. It was not governed by the intervention of a deity who had indulged in independent acts of creation. From a relatively early age he had been deeply suspicious of appeals to the miraculous. He placed the “fixed laws of nature” in opposition to them. Nor was nature governed by the micro-managing God of Asa Gray or John Herschel. Because his theory of natural selection could explain why organic structures had the appearance of design, Darwin had no need for regulation by the final causes that had been so fundamental to Whewell’s philosophy of biology. Nor was nature governed by a god-of-the-gaps, that favourite but ill-conceived god of those religious apologists tempted to take

refuge in the ever-shrinking domain of the scientifically inexplicable. Darwin was deeply indebted to Asa Gray for his presentation of natural selection to an American readership without theological odium. But Gray almost fell into the god-of-the-gaps trap. In arguing that natural selection was not inconsistent with natural theology, he proposed that “at least while the physical cause of variation is utterly unknown and mysterious, we should advise Mr. Darwin to assume, in the philosophy of his hypothesis, that variation has been led along certain beneficial lines.” As we have seen, this was advice that Darwin declined to take, given the randomness in the distribution of variation.

Darwin may have sensed that to open doors on the openness of nature was not necessarily advantageous to theology. He emphatically resisted the temptation to see divine providence in the troubling particularities of natural phenomena. In a well-known letter to Gray he writes:

An innocent and good man stands under a tree and is killed by a flash of lightning. Do you believe (and I really should like to hear) that God *designedly* killed this man? Many or most persons do believe this; I can't and don't.

There is more to this than meets the eye because it could be argued that, for all his agnosticism, Darwin had seen in his scientific naturalism the rudiments of a possible theodicy. Whether he was discussing human suffering, or animal suffering, or what he once called a “long succession of vile molluscos animals”, whether he was discussing the devilish ichneumon wasp that laid its eggs in caterpillars, whether he was discussing natural disasters, he would not allow God to be immediately and directly responsible for them. Theological capital was to come not from finding gaps in the fabric of nature, but from the realisation that a universe in which the evolution of the higher animals had been possible was a universe in which there would also be the potential for misery and tragedy. Solace could be found in the belief that happiness nevertheless prevailed.

If we can say that there was a residual theodicy in Darwin, it was succinctly expressed in a letter to Mary Boole written in December 1866:

it has always appeared to me more satisfactory to look at the immense amount of pain and suffering in this world, as the inevitable result of the natural sequence of events, i.e. general laws, rather than from the direct intervention of God ...

But there was also a problem with this absolution of the deity and Darwin immediately conceded it: "I am aware this is not logical with reference to an omniscient deity". I suspect he means that an omniscient deity could surely have devised laws that would not have generated so many adverse consequences. In the same letter he cannot refrain from adverting once again to the same old problem of "free will and necessity", which he says "has been found by most persons insoluble". The grounds for agnosticism have again come to the surface. And this brings me to my final question: in his most agnostic pronouncements, what had he to say about law, order and purpose?

The argument from order to purpose

Darwin's initial project, back in 1837/38, had been to identify the laws of change, with a view to finding the lawful causes of change. But, as Jonathan Hodge has indicated, there was a sense in which this ambition was at least partially thwarted as he developed his concept of natural selection. There were to be occasions, as in his *Autobiography*, when Darwin would refer to natural selection as a *law*. As a continual process in nature, it followed from the lawful tendencies of heredity, variation and superfecundity. But, as Hodge observes, "natural selection did not have a law of its own" – in the way that the force of gravitational attraction obeyed an inverse square law. Moreover, as Elliott Sober has insisted, Darwin's two main theses - of common ancestry and the importance of natural selection - are principally historical claims. They are expressed in singular statements and are therefore not *laws* of nature by conventional criteria. Nevertheless, in Darwin's own writing, a vocabulary of *law* had continued to dominate his remarks on how nature is governed - if "governed" is the right word to use. Perhaps one reason for the tenacity with which he retained this vocabulary was his realisation, especially when at his most sceptical about religious beliefs, that the concept of "laws" could be turned *against* theistic assumptions about divine intentionality.

If there had been a time when Darwin saw in the order of nature evidence for the existence of a God, whose purposes had been mediated through natural laws, in old age there were times when he completely detached the concept of order from that of purpose. On these occasions the concept of natural law was finally turned against a teleological argument. Writing to William Graham in the year before his death, Darwin dissents from Graham's assertion that the very existence of natural laws implies purpose. Darwin says he cannot see this and immediately adds: "Not to mention that many expect that the several great laws will some day be found to

follow inevitably from some one single law". This is perhaps as close to Stephen Hawking as Darwin ever came! But he has still not finished with his correspondent. Look at the moon, he says, where the law of gravitation – and no doubt of the conservation of energy – of the atomic theory, etc, etc, hold good and then consider whether there is any purpose. "Would there be purpose if the lowest organisms alone, destitute of consciousness existed in the moon?" At this point in the earliest edition of Darwin's correspondence, there is a footnote in which his son Francis records a conversation between his father and the Duke of Argyll. With reference to Darwin's writings on the fertilization of orchids and other contrivances for specific purposes in nature, the Duke had volunteered his belief that it was impossible to look at these without seeing them as the effect and expression of mind. Darwin had replied: "Well, that often comes over me with overwhelming force; but at other times ... it seems to go away."

A concluding irony

I began by underlining several respects in which reference to "laws impressed on matter by the Creator" had, one might almost say, a natural place in theological reflections on a created order. From Descartes onwards this was a way of talking about the governance of nature that held advantages for Christian theology as well as for physical science. Christian commentators would often say that it offered an incomplete account of divine providence, but they usually considered it a legitimate way of interpreting an ordered universe. Therefore, we should not make the mistake of imagining that the multiplication of explanations involving natural causes and natural laws automatically threatened belief in a sovereign deity. In this respect a popular antithesis between the natural and supernatural can be simplistic. A recent historical survey by Ronald Numbers has documented this very point. He writes: "despite the occasional efforts of unbelievers to use scientific naturalism to construct a world without God, it has retained strong support [within Christian orthodoxy] down to the present." And, he adds, "well it might, for ... scientific naturalism was largely made in Christendom by pious Christians." Theological interests had "seldom precluded searching for natural causes or using natural therapies".

But, if this is true, there is also an irony that has not gone unnoticed. The concept of divinely ordained laws of nature could very easily become the Trojan horse that allowed a once purely *methodological* naturalism to breach the defences of theistic orthodoxy. This thesis was brilliantly argued some years ago by John Durant in a Cambridge doctoral dissertation and in his editorial introduction to *Darwinism and*

Divinity (1985). Divinely decreed *laws* of nature were, during the nineteenth century, subtly transposed into laws *of nature*. The irony is, I think, captured in the life and philosophical ruminations of Darwin. Indeed he alluded to it in his *Autobiography*: “Considering how fiercely I have been attacked by the orthodox it seems ludicrous that I once intended to be a clergyman.”

Bibliography

Many of the sources from which I have drawn can be found in John Hedley Brooke. “ ‘Laws impressed on matter by the Creator’?: The *Origin* and the question of religion”, in *The Cambridge Companion to the “Origin of Species”*, ed. Michael Ruse and Robert J. Richards (Cambridge University Press, 2009), 256-74.

I have also drawn on my two earlier essays:

“The Relations between Darwin’s Science and his Religion”, in *Darwinism and Divinity*, ed. John Durant (Oxford: Blackwell 1985), 40-75.

“The natural theology of the geologists: some theological strata”, in *Images of the Earth*, ed. L. J. Jordanova and Roy Porter, 2nd edtn (British Society for the History of Science, 1997), 53-74.

In the paper I have also referred to:

John Durant, “Darwinism and Divinity: A century of debate” in *Darwinism and Divinity*, 9-39.

Jonathan Hodge, “The notebook programmes and projects of Darwin’s London years”, in *The Cambridge Companion to Darwin*, ed. Jonathan Hodge and Gregory Radick, 2nd edtn (Cambridge University Press, 2009), 44-72.

David L. Hull, “Darwin’s science and Victorian philosophy of science”, in *The Cambridge Companion to Darwin*, 2nd edtn , 173-96.

Peter van Inwagen, “Weak Darwinism”, in *Darwin and Catholicism*, ed. Louis Caruana (London: T & T Clark, 2009), 107-20.

David Kohn, “Darwin’s ambiguity: the secularization of biological meaning”, *British Journal for the History of Science* 22 (1989), 215-39.

Ronald L. Numbers, “Science without God: natural laws and Christian beliefs”, in *When Science and Christianity Meet*, ed. David C. Lindberg and Ronald L. Numbers (Chicago: Univ. of Chicago Press, 2003), 265-85.

Elliott Sober, “Metaphysical and epistemological issues in modern Darwinian theory”, in *The Cambridge Companion to Darwin*, 2nd edtn , 302-22.

Edward O. Wilson, “Intelligent evolution.” *Harvard Magazine*, Nov/Dec 2005, 29-33.