

# Darwin, Lyell and the Origin of Species

Dominic Statham

It is commonly believed that Charles Darwin rejected the biblical account of creation and formulated his theory of evolution as a result of amassing overwhelming scientific evidence. This view appears to be poorly supported by historical research. A better case can be made that Darwin's ideas arose from his rejection of Christianity and his embracing the deistic belief system of his friend and mentor Charles Lyell. Lyell saw God as a law-giver, who had endowed the universe with fixed laws governing not only physics, chemistry and geology, but also "creative" biological processes. Darwin came to view the natural world in a similar way, championing the adage, "everything in nature is the result of fixed laws". Accepting Lyell's view that the sedimentary rocks were laid down gradually over millions of years, and that fossils provided an account of the history of life, Darwin sought to identify the laws that he believed must exist to produce new life forms. Neither Darwin nor Lyell ever proved their ideas from data—instead, they imposed their world-view and their imaginations on what they saw. Darwin's theory was no more than a hunch that seemed right in the light of a deistic belief system.

*"The ideal of the coolly rational scientific observer, completely independent, free of all preconceived theories, prior philosophical, ethical and religious commitments, doing investigations and coming to dispassionate, unbiased conclusions that constitute truth, is nowadays regarded by serious philosophers of science (and, indeed, most scientists) as a simplistic myth."*<sup>1</sup> Professor John Lennox, Fellow in Mathematics and the Philosophy of Science, Oxford University.

In his youth, Charles Darwin (1809–1882) was undoubtedly subjected to a most diverse range of religious and philosophical ideas. His grandfather, Dr Erasmus Darwin, was a physician, a Fellow of the Royal Society and a "free-thinker". Unafraid of social stigma, the promiscuous doctor composed erotic verse, supported the American and French Revolutions, and published material promoting evolutionary beliefs. He believed in a distant deity, bordered on agnosticism and derided Christianity. He recorded his evolutionary views in a number of literary works, including his *Zoönomia*, which Charles had read and admired.<sup>2</sup> He was often referred to as the "English Lamarck", and was probably the most prominent British evolutionist of his day.

Charles's maternal grandfather, Josiah Wedgwood, who built the Wedgwood pottery business, was equally radical. Surrounded by the new engineers and scientists, and the drivers of the Industrial Revolution, he developed new production processes and perfected factory organization. Along with Erasmus Darwin, he was a member of the Lunar Society in which the élite technocrats of the new order met to discuss their world-changing ideas. One of these was Joseph Priestley, a leading Unitarian philosopher, chemist and theologian, who believed in a material world where laws of nature hold sway, everything has a physical cause, and miracles have no place. Wedgwood greatly admired Priestley, and appointed a Unitarian minister to teach in a school at one of his factories where Charles's father, Robert, attended as a pupil.<sup>3</sup>

## Edinburgh and Cambridge

As a medical student at Edinburgh (October 1825–April 1827), Charles keenly attended student societies, including the *Plinian* where he was even elected to the Council. Here he listened to fiery free-thinkers who wanted to "liberate science" from religious influences. Lectures were given by radicals intent on reforming Church-dominated society and removing the Church's influence. On one occasion, one of the Presidents, William Browne, argued strongly against the claim that God had made the human face with muscles that enabled him to express emotions, reflecting his unique moral nature. Browne saw no difference between men and animals. Another speaker, William Greg, no older than Darwin, gave a talk aiming to show that "the lower animals possess every faculty and propensity of the human mind." Another member of the *Plinian* was Robert Grant, a doctor of twelve years standing and who was sixteen years Darwin's senior. Darwin and Grant spent much time together as walking companions, and shared an intense interest in the natural world. Grant was an uncompromising evolutionist, who espoused the views of both Darwin's grandfather, Erasmus, and Jean-Baptiste Lamarck with unbounded enthusiasm. Grant was another free-thinker, who saw all of nature as the consequence of natural forces, rather than the work of a creator God. He was also strongly anti-Christian.<sup>4</sup>

Conversely, at Shrewsbury School, and as a student of theology at Cambridge University (1828–1831), Charles came under the strict influence of orthodox Anglicanism. Moreover, to enrol at Cambridge University, it was necessary for him to subscribe to the Thirty-Nine Articles of the Anglican faith, something that his older brother, Erasmus, had done as a student there six years earlier. This reflected a growing willingness of the Darwins to adopt "Anglican respectability", something which was becoming common even amongst Unitarians—including the Wedgwoods. Josiah had become the parish patron and had installed his nephew as vicar of Maer and his daughter, Emma, Charles's future wife, was confirmed there at St Peter's Church. Charles's sisters were devout, and Caroline

had written to him while at Edinburgh, encouraging him to read the Bible and to take the sacrament.

While at Cambridge, Charles read William Paley's *Evidences of Christianity*, which argued that the natural world is clearly the product of design. Charles agreed, and was so delighted by its logic that he virtually learnt it by heart.<sup>5</sup> All his tutors were Anglicans who regarded evolutionary ideas as morally dangerous and universally condemned them. While at Cambridge, he developed a strong bond with one of his professors, John Henslow, an expert in botany. Charles was most impressed, not only by his knowledge of nature, but also by his character, and wrote of him that "[h]is moral qualities were in every way admirable. He was free from every tinge of vanity or other petty feeling; and I never saw a man who thought so little about himself or his own concerns ... [His] benevolence was unbounded."<sup>6</sup>

Henslow had a very different view of the natural world to that of Grant or Charles's grandfather, Erasmus, insisting to the young Darwin that life ultimately derived its power from God and that there were no self-activating natural laws. He was very orthodox and would have had no truck with evolutionary views.<sup>7</sup>

### Charles Lyell

The most significant influence on Charles's thinking, however, undoubtedly came from the lawyer and geologist Charles Lyell. Lyell shared the radical Unitarian belief that the world should be explained only by the action of natural laws currently operating. He was a deist<sup>8</sup> and, in his thinking, God made the universe, but then played no part in its subsequent history (except, however, in the case of the supernatural creation of man).<sup>9</sup> Particularly, he espoused the principle of *uniformitarianism*—that "the present is the key to the past."<sup>10</sup> According to this, the geological record should be interpreted by assuming that processes observed today had operated in a similar fashion in the past. Rivers are currently seen to be eroding valleys very slowly, so valleys and canyons seen today must have been eroded slowly, over millions of years. Sediments are currently deposited in lakes and seas very slowly, so, again, sedimentary rocks seen today must have been built up slowly, over millions of years. Similarly, volcanic activity is understood to be acting gradually, continuously raising or lowering land masses and continents, over eons of time. All this was in sharp contrast to the thinking of most of Lyell's contemporaries, who saw in the rocks either a series of violent catastrophes—floods



Portrait by Joseph Wright of Derby (1792), from <www.wikipedia.org>

**Figure 1.** Charles Darwin's paternal grandfather, Erasmus Darwin (1731–1802), who was known as the "English Lamarck". Charles had clearly given much thought to Erasmus's evolutionary ideas, and had used the title of Erasmus's book, *Zoonomia*, as the heading for the first page of one of his own notebooks on evolution.

and cataclysmic volcanic activity—or the aftermath of the Genesis Flood.

According to Lyell, the rocks tell the story of continual birth and extinction of species. Thus, plants and animals would have been created (or would have arisen by natural processes)<sup>11</sup> with a form specially adapted to suit a particular environment. Then, over the millennia, as the environment changed, these would have become extinct, only to be replaced by new species—as the old forms died out, somehow new ones were born. Although Lyell did not at that stage believe in a progressive evolutionary process as Darwin was later to conceive, he did argue for the rocks providing a history of life over millions of years.<sup>12</sup>

The influence of Lyell's thinking on Charles cannot be overestimated. Referring to his voyage on the *Beagle* (1831–1836), he wrote,

"I had brought with me the first volume of Lyell's *Principles of Geology*, which I studied attentively; and this book was of the highest service to me in many ways. The very first place which I examined, namely St. Jago in the Cape Verde islands, showed me clearly the wonderful superiority of Lyell's manner of treating geology, compared with that of any other author whose works I had with me or ever afterwards read."<sup>13</sup>

Speaking of the time he lived in London after the *Beagle* voyage, he commented, "I saw more of Lyell than of any other man both before and after my marriage. His mind was characterised, as it appeared to me, by clearness, caution, sound judgment and a good deal of originality."<sup>14</sup> In later life, Darwin wrote, "The science of Geology is enormously indebted to Lyell—more so, as I believe, than to any other man who ever lived."<sup>15</sup>

While living in London (1837–1842), and as a friend of Lyell, he received invitations to social events where he rubbed shoulders with some of the most influential scientists and thinkers of the time. These included Charles Babbage, the mathematician, philosopher and engineer, who is known for inventing what might be claimed to be the first mechanical computer. Babbage saw God as a divine programmer, who had appointed new animals and plants to appear like clockwork throughout history—but through laws with which he had endowed the natural world from its beginning, rather than through ongoing miraculous creation. Another friend of Lyell was John Herschel, sometimes referred to as the *de facto* head of science in Britain at the time. He also believed that God had set up laws at the creation of the universe, which

had operated throughout geological history, continuously producing new species. Another influence came from the novelist and social commentator Harriet Martineau, whom Darwin came to know through his brother, Erasmus. A radical Unitarian, she also saw the natural world as subject to laws, rather than the province of divine miracles. In her circle, Anglican creationist views obstructed the self-developing potential of man—what was needed was social and political reform so that human progress (or “evolution”) could take its course.<sup>16</sup>

### Growing deistic beliefs

The influence of Darwin’s new acquaintances can be gauged from his notebooks, written during this same period. Prior to this, he professed an orthodox Christian faith and a high respect for the Bible,<sup>17</sup> but these views were quickly abandoned. He wrote in his autobiography, “[d]uring these two years [October 1836 to January 1839] I was led to think much about religion ... [and] I gradually came to disbelieve in Christianity.”<sup>18</sup> Moreover, his thinking had not only become that of a sceptic, but someone who was scornful of Christianity. Arrogant, he now believed, was the view that the universe had been made or adapted for man, rather than man having become adapted to the universe.<sup>19</sup> Equally arrogant, he felt, was the idea that man was the pinnacle of the natural world: “the appearance of insects with other senses is more wonderful” he claimed.<sup>20,21</sup> “A man ... may be congratulated [for doing good]”, but the act is not really his own and he “deserves no credit.”<sup>22</sup> Similarly, “wickedness is no more a man’s fault than bodily disease.”<sup>22</sup>

What is particularly significant is how deistic his thinking had become. He now regarded the miracles recorded in the Bible as being accepted by the men at that time because they were “ignorant and credulous to a degree almost incomprehensible by us.”<sup>23</sup> Indeed, he mused, “the more we know of the fixed laws of nature the more incredible do miracles become.”<sup>23</sup> Thought, he argued, is no more than a secretion of the brain, just as gravity is an intrinsic property of matter.<sup>24</sup> Even “love of the deity [is the] effect of organization. Oh you Materialist”, he jokingly chided himself.<sup>24</sup> Later he was to assert, “Everything in nature is the result of fixed laws.”<sup>25</sup> Since science had never shown any of these musings of Darwin to be true, however, such views can only have arisen through the embracing of an ideology—in this case, surely, the deistic mindset of his new friends.

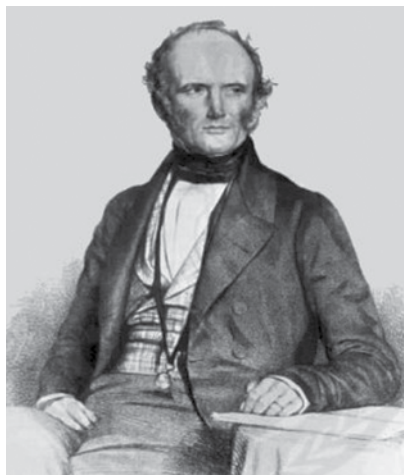
Judging from letters and scientific notes written while on the *Beagle* voyage, it seems clear that Darwin had not been inclined towards evolutionary thinking prior to 1836.<sup>26</sup> Indeed, the popular view

that he had some sort of *eureka* moment when visiting the Galápagos Islands, appears to be one of the great myths of history.<sup>27</sup> However, in his autobiography, he stated that he had “clearly conceived” his theory by 1839.<sup>28</sup> The germ of his evolutionary ideas, therefore, arose during exactly the same period that his Christian beliefs were waning. In July 1837, he began a notebook in which he recorded his thoughts about “transmutation” (evolution). On the first page, in bold letters, he penned its title, *Zoonomia*, the name of his grandfather Erasmus’s book, in which Erasmus had expressed his evolutionary ideas forty years earlier.<sup>29</sup> In subsequent years, Darwin was to take up many more of his grandfather’s themes.<sup>30</sup>

It is not difficult to see how Darwin’s thinking, under the influence of Lyell’s geology, led to a full-blown theory of evolution: The world was millions of years old, and the rocks told the story of its slowly changing life cycles. Fossils showed that, over the course of time, species had appeared and disappeared, as new plant and animal forms had replaced old ones. Since God did not intervene in the world, but had endowed it with natural “creative” laws, the appearance of new species must be the result of these laws. Species variation and natural selection provided a mechanism by which new plant and animal forms could arise. Lyell had shown how gigantic valleys had been formed by gradual erosion, one grain at a time; similarly, natural selection acted by the preservation and accumulation of a great number of infinitesimally small inherited modifications.<sup>31</sup> How well it fitted together! But to what extent was this thinking really the product of science and to what extent the product of a deistic world-view?

### Lyellian geology

Firstly, let us consider the Lyellian view of geology, which Darwin had so readily accepted. Was this really such good science? There appears to be little doubt that Lyell was greatly influenced by James Hutton and George Poulett Scrope, both of whom were deists and believed in long ages and gradual geological processes.<sup>32,33</sup> At the same time, he clearly set aside opposing views, including those of very competent geologists such as Louis Agassiz—and Georges Cuvier, who has been described as “perhaps the finest intellect in nineteenth century science”.<sup>34</sup> That Lyell should have given the work and opinions of some geologists so much more prominence than those of others, in an age when so little was known about the geological record, is surely significant. Indeed, during the period that Lyell was formulating his ideas, many were urging caution, arguing that knowledge of the earth was just



Portrait from <www.wikipedia.org>

**Figure 2.** Sir Charles Lyell (1797–1875). Darwin was greatly influenced by Lyell who was openly deistic in his thinking. Darwin came to believe, *a priori*, that everything he observed could be explained by natural laws and natural processes.

too scant to provide enough data for a general theory of geology.<sup>35</sup>

In a letter written just after the publication of the second volume of Lyell's *Principles of Geology*, Scrope remarked, "It is a great treat to have taught our section-hunting quarry men that two thick volumes may be written on geology without once using the word 'stratum'."<sup>36</sup> It was these strata, however, that provided much of the evidence *against* uniformitarian geology—Lyell had simply ignored them. That Lyell had set aside the known data that challenged his theory was a view expressed, amongst others, by Adam Sedgwick, who was Professor of Geology at Cambridge University. Writing in the *Proceedings of the Geological Society* in 1834, Sedgwick described Lyell's theory as a case of "special pleading", a lawyer's term for an argument in which the speaker deliberately ignores aspects which are unfavourable to his point of view.<sup>37</sup>

In an article in which he argued for the necessity of invoking both catastrophic and gradual processes in explaining geological observations, the Harvard University Professor of Geology, Stephen J. Gould commented,

"Charles Lyell was a lawyer by profession, and his book is one of the most brilliant briefs ever published by an advocate ... [but he] relied upon two bits of cunning to establish his uniformitarian views as the only true geology."<sup>38</sup>

According to Professor Gould, the first bit of cunning was to set up a "straw man" to demolish. This was to imply that his scientific opponents argued against his theory on the basis of a belief in a young earth, which was untrue. The arguments against Lyell's theory were based on geological observations, and were presented by people who believed in an ancient earth as well as those who believed in a young earth. The second bit of cunning was to persuade his readers that the rejection of his uniformitarianism would amount *per se* to a rejection of science itself. That is, acceptance of the scientific principle of the uniformity (unchanging character) of natural law necessitated an acceptance of the uniformity (unchanging character) of geological processes. This was also a misrepresentation of other views of geology.<sup>39</sup> Gould continued,

"In fact, the catastrophists [such as Agassiz and Cuvier] were much more empirically minded than Lyell. The geologic record does seem to require catastrophes: rocks are fractured and contorted; whole faunas are wiped out. To circumvent this literal appearance, Lyell imposed his imagination upon the evidence. The geologic record, he argued, is extremely imperfect and we must interpolate into it what we can reasonably infer but cannot see. The catastrophists were the hard-nosed empiricists of their day, not the blinded theological apologists."<sup>40</sup>

There are many other indications that Lyell's thinking was influenced by more than just scientific considerations. For example, he believed that, just as the raising and lowering of the earth's continents was cyclical

in history, so also was the earth's flora and fauna. He fully expected, for example, that dinosaurs would return to repopulate the earth in some future epoch.<sup>41</sup> Such a belief, however, was clearly based on an ideology, and had no basis in the fossil record. Cuvier, for example, had provided sound evidence that the higher classes of quadrupeds appear later in the geological record and that fish appear before land animals.<sup>42</sup> Lyell's failure to acknowledge the sequence seen in the fossil record has even been described as "self-inflicted blindness".<sup>43</sup>

In the nineteenth century, it was common for economic and scientific paradigms to encompass religious, historical, political and social views, as well as observations and data.<sup>44-46</sup> Many believed, for example, that, just as there were natural laws governing the behaviour of the earth (geology), there were similar natural laws governing the behaviour of economies, and analogies could be drawn from one and applied to the other. In this Lyell was no exception, and his geology appears to have been influenced not only by his deistic beliefs, but also by subjects as wide-ranging as history, linguistics, demography and economics.<sup>47</sup> Martin J.S. Rudwick, Emeritus Professor of History at the University of California, and an expert in the history of earth sciences, argued,

"I therefore conclude that a full understanding of the Lyellian concept of geological time, which was so crucially important for the later development of geology and for Darwin's work in biology, must take into account its possible origin (at least in part) in the work of Scrope, who in turn may have derived it (at least in part) from his concern with the social problems of political economy."<sup>48</sup>

Moreover, many others believed that their growing understanding of geology mirrored and complemented their growing understanding of social progress and the role of politics and government in society. Not surprisingly, the different models of geology—uniformitarian and catastrophist—led to very different political views. Lyell, for example, appeared to be using his theory of uniformitarianism to support secular, liberal Whig policies over and against the theistic paternalism of the Tories. Tories supported the idea of monarchy, arguing that, just as God ruled over the material world of geology, so he ruled over people through the aristocracy under the king or queen. Conversely, Whigs argued that because the material world is governed by natural rather than supernatural processes, there should be a gradual transfer of power away from "monarchy under God" to the people.<sup>49</sup> Speaking of Lyell and his followers, Professor Ager commented, "... geology got into the hands of the theoreticians who were conditioned by the social and political history of their day more than by observation in the field."<sup>50</sup>

Despite their lack of scientific rigour, by the middle of the nineteenth century Lyell's three volumes of the *Principles of Geology* had convinced many, and in the calculated and masterly way of a brilliant lawyer, he had achieved his stated aim of freeing the study of geology

from biblical influences.<sup>51,52</sup> He had, however, subjected it to Unitarian, deistic principles instead.

### Fossils and faith

But what of Darwin's other arguments supporting evolution? He knew very well that the fossil record did not support a belief in gradual evolutionary change. In chapter 9 of *Origin of Species*, he identified three geological observations which, in respect of his theory, were, in his own words, "undoubtedly of the gravest nature":

- "our not finding in the successive formations infinitely numerous transitional links between the many species which now exist or have existed"
- "the sudden manner in which whole groups of species appear in our European formations"
- "the almost entire absence, as at present known, of fossiliferous formations beneath the Silurian strata."<sup>53</sup>

Indeed, he freely admitted,

"... the number of intermediate varieties, which have formerly existed on the earth, [must] be truly enormous. Why then is not every geological formation and every stratum full of such intermediate links? Geology assuredly does not reveal any such finely graduated organic chain; and this, perhaps, is the most obvious and gravest objection which can be urged against my theory."<sup>54</sup>

His belief, however, that all this could be explained in terms of "the extreme imperfection of the geological record"<sup>54</sup> is surely a statement of faith. Remarkably, he went on to argue,

"... from our ignorance of the geology of other countries ... it seems to me to be about as rash in us to dogmatize on the succession of organic beings throughout the world, as it would be for a naturalist to land for five minutes on some one barren point in Australia, and then to discuss the number and range of its productions ... We should not forget that only a small portion of the world is known with accuracy."<sup>55</sup>

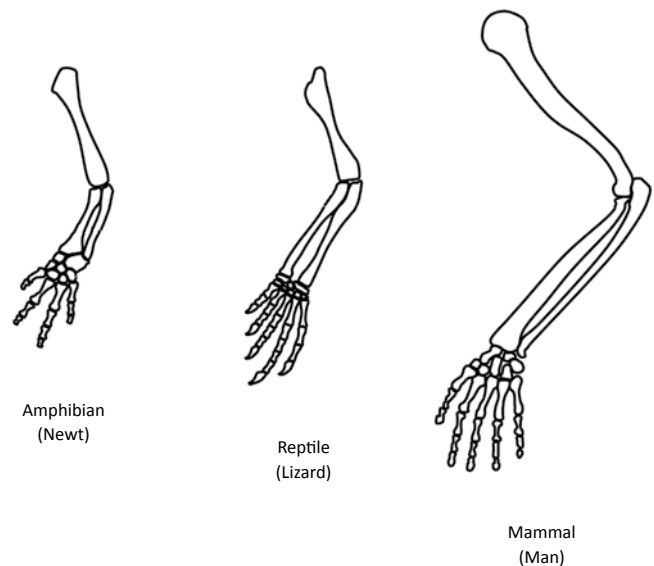
But if geological and palaeontological knowledge was too scant for creationists to argue against evolution on the basis of it, how sound was *his* thinking when it relied so heavily on a particular interpretation of the rocks?

### "Laws of evolution"

Darwin believed that "the law of variation", upon which natural selection acted so as to drive the macro-evolutionary process, was the same "law of variation" which was exploited by breeders in artificial selection. Indeed, he wrote, "It is a beautiful part of my theory, that domesticated races of organics [organisms] are made by precisely same means as species—but latter far more perfectly & infinitely slower."<sup>56</sup> However, while it is true that he had seen breeders produce remarkable differences in species such as pigeons and dogs, it was well known in the nineteenth century that there appeared to be clear limits to the extent to which

animals could be modified by artificial selection. Pigeons always remained pigeons and dogs always remained dogs. What reason did he have for believing it to be different in the natural world? His response to this argument is most revealing: "It has often been asserted, but the assertion is quite incapable of proof, that the amount of variation under nature is a strictly limited quantity."<sup>57</sup> In other words, since he believed that his opponents could not prove that variation in nature is limited, there was no reason for him to believe that it is! But what sort of science is this? In real science, for an hypothesis to be accepted, it is necessary to prove from data that your assumptions have validity. Indeed, one of the most remarkable statements in the *Origin of Species* reads, "Slow though the process of selection may be, if feeble man can do much by his powers of artificial selection, I can see no limit to the amount of change ... which may be effected in the long course of time by nature's power of selection."<sup>58</sup> This is perhaps one of the greatest statements of faith in the whole book. Darwin simply assumed that organisms have unlimited potential for variation, despite the experience of the breeders. Moreover, he appeared to base his whole theory on this, at the same time admitting, "Our ignorance of the laws of variation is profound."<sup>59</sup>

Darwin's belief in this "law of variation" arose very early in his thinking. He wrote in his autobiography, "As soon as I had become, in the year 1837 or 1838, convinced that species were mutable productions, I could not avoid the belief that man must come under the same law."<sup>60</sup> And,



**Figure 3.** The vertebrate forelimbs are considered to be strictly homologous (i.e. similar due to shared ancestry). However, not only is their embryonic development fundamentally different, but they also grow from different parts of the egg: in the newt (an amphibian) they develop from the trunk segments 2,3,4 and 5, in the lizard (a reptile) from segments 6,7,8 and 9, and in man (a mammal) from segments 13,14,15,16,17 and 18. There are many other examples of claimed homologous structures developing differently and from different parts of the egg. See Gavin de Beer, *Homology, An Unsolved Problem*. Oxford University Press, London, UK, 1971.

commenting on his observations of the facial expressions of his first born child in 1839, he wrote, “I felt convinced, even at this early period, that the most complex and fine shades of expression must all have had a gradual and natural origin.”<sup>61</sup> That he “felt convinced” of this so early in his thinking, and without any data, suggests that this conviction arose much more from his growing deistic beliefs than from scientific enquiry. Later, his faith in the existence of the “laws” of evolution became paramount: “The old argument of design in nature, as given by Paley, which formerly seemed to me so conclusive, fails, now that the law of natural selection has been discovered. Everything in nature is the result of fixed laws.”<sup>62</sup>

Darwin’s view of the patterns (homologies) seen in the natural world is also significant. In respect of the “tendency in organic beings descended from the same stock to diverge in character as they become modified”, he wrote, “[t]hat they have diverged greatly is obvious from the manner in which species of all kinds can be classed under genera, genera under families, families under sub-orders and so forth.”<sup>63</sup> But this *assumes* an evolutionary interpretation of the patterns in nature—surely to any thinking man, patterns can also be explained by a designer. Moreover, Darwin’s definition of homology as “that relation between parts which results from their development from corresponding embryonic parts”<sup>64</sup> is just what homology is not: homologous structures not only develop through different embryonic processes, but often develop from different parts of the egg.<sup>65</sup> The evolutionary paradigm appears to have been so strong that it not only dictated the interpretation of data, but also created data itself.

### Deism not data

Lyell’s deistic view of geology had so gripped the young Darwin that he wrote to his friend, Leonard Horner,

“... I cannot say how forcibly impressed I am with the infinite superiority of the Lyellian school of Geology over the Continental. I always feel as if my books came half out of Lyell’s brains & that I never acknowledge this sufficiently, nor do I know how I can, without saying so in so many words—for I have always thought that the great merit of the *Principles*, was that it altered the whole tone of one’s mind & therefore that when seeing a thing never seen by Lyell, one yet saw it partially through his eyes.”<sup>66</sup>

Janet Browne, Professor in the History of Science at Harvard University, comments, “Lyell’s writings ... became the hub of all his later biological thinking”<sup>67</sup> and “... without Lyell there would have been no Darwin.”<sup>68</sup> Lyell had convinced him that the geological landscape had been constantly and gradually changing, over eons of time. The rocks thus told the story of the changes in plants and animals over the long history of the earth<sup>69</sup>—changes which themselves, according to Lyell, most likely also arose through natural processes.<sup>70</sup> Indeed, as Darwin once wrote to

his friend Joseph Hooker, “I feel sure that at times he [Lyell] no more believed in Creation than you or I.”<sup>71</sup>

From these considerations, it can be seen that Darwin’s theory of evolution did not arise from purely scientific thinking, as many claim. Rather, his conclusions about the natural world, both in geology and biology, were clearly founded on a deistic belief system—and one that, taken to its logical conclusion, surely *engendered* an evolutionary interpretation of what he saw around him. Referring to the origin of the first primitive forms of life in another letter to Hooker, he wrote that he regretted referring to the biblical concept of “creation” in some earlier editions of his *Origin of Species*<sup>72</sup> as he “really meant ‘appeared’ by some wholly unknown process”.<sup>73</sup> Indeed, as he was at pains to stress, “Everything in nature is the result of fixed laws.”<sup>74</sup> But what science had ever shown this to be true?

### References

1. Lennox, John C., *God’s Undertaker—has science buried God?* Lion Hudson, Oxford, p. 32, 2007.
2. Barlow, N. (Ed.), *The Autobiography of Charles Darwin*, Collins, St James’s Place, London, p. 49, 1958; <<http://darwin-online.org.uk/content/frameset?itemID=F1497&viewtype=text&pageseq=1>>.
3. Desmond, A. and Moore, J., *Darwin*, Penguin, London, p. 9, 1991.
4. Desmond and Moore, ref. 3, pp. 31–40.
5. Darwin, C., Letter to John Lubbock, 22<sup>nd</sup> November 1859; <<http://www.darwinproject.ac.uk/darwinletters/calendar/entry-2532.html>>.
6. Barlow, ref. 2, p. 65.
7. However, Henslow accepted the concept of deep time, which probably paved the way later for Darwin to willingly embrace Charles Lyell’s uniformitarian geology, which he thought provided enough time for biological evolution. See Grigg, R., Darwin’s mentors, *Creation* 31(1):50–53, 2010.
8. A theist believes in a creator who intervenes in the universe, whereas a deist believes in a creator who does not.
9. See also 2 Peter 3:3–7.
10. Lyell, C., *Principles of Geology*, vols. 1, 2 and 3, John Murray, London, 1830, 1832, 1833.
11. Corsi, P., *Science and Religion. Baden Powell and the Anglican debate, 1800–1860*, Cambridge University Press, Cambridge, p. 243, 1988.
12. Darwin, C., *On the Origin of Species*, First edition, John Murray, London, pp. 310, 312, 1859; <<http://darwin-online.org.uk/content/frameset?itemID=F373&viewtype=side&pageseq=1>>.
13. Barlow, ref. 2, p. 77.
14. Barlow, ref. 2, p. 100.
15. Barlow, ref. 2, 101.
16. Desmond, ref. 3, pp. 212–217.
17. Barlow, ref. 2, pp. 57, 85.
18. Barlow, ref. 2, pp. 85–86.
19. Darwin, C., *Notebook D*, p. 49, 1838; <<http://darwin-online.org.uk/content/frameset?viewtype=text&itemID=CUL-DAR123.-&pageseq=1>>.
20. Darwin, C., *Notebook B*, p. 207, 1837–1838; <<http://darwin-online.org.uk/content/frameset?viewtype=text&itemID=CUL-DAR121.-&pageseq=>>>.

21. Darwin, C., *Notebook C*, p. 196–197, 1838; <<http://darwin-online.org.uk/content/frameset?itemID=CUL-DAR122.-&viewtype=text&pageseq=1>>.
22. Darwin, C., *Old and USELESS Notes about the moral sense & some metaphysical points written about the year 1837 & earlier*; p. 409; <<http://darwin-online.org.uk/content/frameset?itemID=F1582&viewtype=text&pageseq=124>>.
23. Barlow, ref. 2, p. 86.
24. Darwin, ref. 21, p. 166.
25. Barlow, ref. 2, p. 87.
26. Davies, R., *The Darwin Conspiracy: Origins of a Scientific Crime*, Gold Square Books, London, p. 33, 2008.
27. Wood, T.C., *A Creationist Review and Preliminary Analysis of the History, Geology, climate, and Biology of the Galápagos Islands*, ch. 2, Wipf & Stock, OR, 2005.
28. Barlow, ref. 2, p. 124.
29. Darwin, ref. 20, p. 1.
30. Barlow, ref. 2, p. 151.
31. Darwin, ref. 12, p. 95.
32. Rupke, N.A., *The Great Chain of History*, Oxford University Press, Oxford, p. 186, 1983.
33. Rudwick, M.J.S., Poulett Scrope on the volcanoes of Auvergne: Lyellian time and political economy, *British Journal for the History of Science* 7(27):205–242, 1974.
34. Ager, D.V., *The New Catastrophism*, ch. 1. Cambridge University Press, Cambridge, UK, 1993.
35. Mortenson, T., *The Great Turning Point*, Master Books, Green Forest, AR, pp. 210–213, 2004.
36. Scrope, G.P., Letter to Charles Lyell, 29<sup>th</sup> September 1832.
37. Rupke, ref. 32, p. 88.
38. Gould, S.J., Catastrophes and steady state earth, *Natural History*, pp. 15–16, Feb 1975.
39. See also Rupke, ref. 32, p. 188.
40. Gould, ref. 38, p. 16–17.
41. Lyell, C., *Principles of Geology*, vol. 1, John Murray, London, p. 123, 1830.
42. Rupke, ref. 32, p. 151.
43. Rupke, ref. 32, p. 190.
44. Rupke, ref. 32, ch. 19.
45. Mortenson, ref. 35, pp. 53–54.
46. Rashid, S., Political economy and geology in the early nineteenth century: Similarities and contrasts, *History of Political Economy* 13(4):726–744, 1981.
47. Rudwick, M.J.S., Transposed concepts from the human sciences in the early work of Charles Lyell; in: Jordanova, L.J. and Porter, R. (Eds.), *Images of the earth*, British Society for the History of Science, ch. 4, 1997.
48. Rudwick, ref. 33, p. 242.
49. Grinnell, G., The origins of modern geological theory, *Kronos* 1(4):68–76, 1976.
50. Ager, D.V., *The Nature of the Stratigraphical Record*, 3<sup>rd</sup> ed., Macmillan Press, Chichester, p. 70, 1993.
51. Lyell, C., Letter to G. Poulett Scrope, June 14, 1830; in: Lyell, K.M. (Ed.), *Life, Letters and Journals of Sir Charles Lyell*, vol. 1, John Murray, London, p. 268, 1881.
52. Moore, J.R., Geologists and interpreters of Genesis in the nineteenth century; in: Lindberg, D. and Numbers, R. (Eds.), *God and Nature. Historical Essays on the Encounter Between Christianity and Science*, University of California Press, London, pp. 328–329, 1986.
53. Darwin, ref. 12, p. 310. NB, this is now called the *Cambrian Explosion*; in Darwin's day, the "Silurian" series defined by Sir Roderick Murchison overlapped "Cambrian" strata named by Adam Sedgwick.
54. Darwin, ref. 12, p. 280.
55. Darwin, ref. 12, pp. 306–307.
56. Darwin, C., *Notebook E*, p. 71, 1838–1839; <<http://darwin-online.org.uk/content/frameset?viewtype=text&itemID=CUL-DAR124.-&pageseq=1>>.
57. Darwin, ref. 12, p. 468.
58. Darwin, ref. 12, p. 109.
59. Darwin, ref. 12, p. 167.
60. Barlow, ref. 2, p. 130.
61. Barlow, ref. 2, p. 131.
62. Barlow, ref. 2, p. 87.
63. Barlow, ref. 2, pp. 120–121.
64. Darwin, C., *On the Origin of Species*, 6<sup>th</sup> ed., John Murray, London, p. 434, 1872; <<http://darwin-online.org.uk/content/frameset?viewtype=sid e&itemID=F391&pageseq=1>>.
65. Denton, M., *Evolution: A Theory in Crisis*, Adler & Adler, Bethesda, MD, ch. 7, 1986.
66. Darwin, C., Letter to Leonard Horner, 29<sup>th</sup> August 1844; <<http://www.darwinproject.ac.uk/darwinletters/calendar/entry-771.html>>.
67. Browne, J., *Charles Darwin: Voyaging*, Pimlico, London, p. 294, 2003.
68. Browne, ref. 67, p. 186.
69. Darwin, ref. 12, pp. 282–287.
70. Ruse, M., Charles Darwin; in: Matthen, M. and Stephens, C. (Eds.), *Philosophy of Biology*, North Holland, London, p. 6, 2007.
71. Darwin, C., Letter to Joseph Hooker, 13<sup>th</sup> March 1863; <<http://www.darwinproject.ac.uk/darwinletters/calendar/entry-4039.html>>.
72. Darwin, C., *On the Origin of Species*, 3<sup>rd</sup> ed., John Murray, London, p. 525. 1861; <<http://darwin-online.org.uk/content/frameset?itemID=F381 &viewtype=text&pageseq=1>>.
73. Darwin, C., Letter to Joseph Hooker, 29<sup>th</sup> March 1863; <<http://www.darwinproject.ac.uk/darwinletters/calendar/entry-4065.html>>.
74. Barlow, ref. 2, p. 87.

---

**Dominic Statham** is a chartered engineer and graduate of Loughborough University in the UK. He has twenty-five years experience in aeronautical and automotive engineering, with Rolls Royce (Aero and Industrial & Marine Divisions) and GKN, a leading supplier of automotive driveline components. His recent vehicle projects include Land Rover Discovery 3, Freelander 2 and the Jaguar XF. He has extensive experience of both manufacturing and product development, and holds a number of patents. He is the author of *Evolution: Good Science? Exposing the ideological nature of Darwin's theory*.

---