

## **DARWIN AND THE POST DARWINIAN DEBATES**

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The publication of Darwin's *On the Origin of Species* in 1859 continued the development of scientific inquiry into the natural world which had its roots in the Scientific Revolution beginning some three centuries earlier. These earlier scientists, Copernicus, Galileo and Newton, maintained their belief in God and sought to interpret the new worlds which were being discovered through a re-interpretation of scripture. The work of Darwin continues this process of defining and refining the interpretation of the book of nature and the book of Scripture. It challenges the Christian doctrine of creation. This paper will discuss the impact of Darwin's *Origin* on both scientific and theological schools of thought. Consideration of ways in which science and religion, evolution and God, can be reconciled will be presented. Finally, we will discuss why such an exercise is warranted.

The work of Darwin adheres to the scientific method in modern physical sciences produced by the work of Galileo, the concept of a systematic, mathematical interpretation of experiments and causal facts.<sup>1</sup> Darwin builds upon Newton's mechanistic conception of nature which presents a demonstrable model for the workings of the universe solely relying on mechanics and completely separate from any spiritual influence. Newton granted astronomy the right to be known as a science.<sup>2</sup>

The specialization of the sciences which began in the Scientific Revolution continued. The astronomy of Copernicus had evolved into the physics of Newton which had reduced the world to purely material stuff, the language of mathematics. Science now expanded into the biology of Darwin, the geology of Charles Lyell and the paleontology of Coneybeare as examples. This was the scientific-philosophical milieu of the day, promoting the ongoing philosophical inversion of the nineteenth century; the movement towards vesting the finite world with absolute meaning and the consequent shift in theology whereby God is seen to be a derivative of this finite world.<sup>3</sup> Adherents to this new theory, Darwinians, were quick to capitalize on Darwin's theory, making God our creature rather than the converse. Hence the teleological argument; the Christian doctrine that all things in nature are on purpose and were made to fulfill a plan or design versus the materialist argument that our place in the universe is due to random chance.

Darwin's theory contained in *Origin of the Species* is simply stated:

As many more individuals of each species are born than can possibly survive; and as, consequently, there is a frequently recurring struggle for existence, it follows that any being, if it vary however slightly in any manner profitable to itself, under the complex and sometimes varying conditions of life, will have a better chance of surviving, and thus be *naturally selected*. From the strong principle of inheritance, any selected variety will tend to propagate its new and modified form.<sup>4</sup>

Darwin exposed a depth in the natural world which had not yet been encountered. Darwin's treatise puts forth a strong case for common descent, but avoids the controversial term "evolution". In fact, Darwin did not use the term "evolution" until the sixth edition of his book, and even then seemed to use it with hesitation.<sup>5</sup> It is notable that Darwin did not invent the concept of evolution; this idea has a long tradition stretching back to the Greeks. The

philosophical context within which Darwin worked is important; he did not create evolution but put forward an explanation by which evolutionary change could take place; “natural selection”.<sup>6</sup>

Darwin’s argument for the origin of the species is based on the Newtonian, hypothetico-deductive ideal, held high by his contemporary philosophers of science. His argument rests on a series of axioms or physical laws; if these laws are true, if the conditions do obtain, then it follows logically that certain consequences will be observed in nature.<sup>7</sup>

As simple as the theory of “natural selection” was, it carried with it a number of revolutionary implications. First, it was a thoroughly non-progressivist model of change. Darwin’s theory assumed the variations in animals were quite random meaning the theory did not presume any sense of evolutionary history moving in an inevitable direction.<sup>8</sup>

Secondly, Darwin thought of animal groups as populations rather than types or species. The emergence of a new species was the by-product of the process of a particular population becoming better adapted to a particular environment. So, natural selection was essentially a theory of population change or a model for explaining the differential reproductive success of animal groups.<sup>9</sup>

Finally, the variations brought about by natural selection were relatively small. New species did not suddenly appear in Darwin’s theory, this would pose a problem for the theory and would negate the need for natural selection to preserve, generation after generation, beneficial adaptations.<sup>10</sup>

David N. Livingstone in “Darwin’s Forgotten Defenders” states that just as it is important to understand what natural selection is about, it is just as important to understand what natural selection is not and that Darwin’s theory continues to be misconstrued.<sup>11</sup>

The first misunderstanding involves the phrase “survival of the fittest”. This term was actually coined by the social theorist Herbert Spencer, not Darwin. In Darwin’s use of this phrase, he was referring to those individuals or species more likely to leave offspring. The fundamental point of Darwinism is that biological forms better adapted to their ecological niches leave more offspring than competitors.<sup>12</sup>

Also requiring clarification is “the struggle for existence”. This phrase was not used by Darwin to imply the savagery implicit in nature, but simply refers to the fact that some members of a population will be better adapted to their environment and will leave more offspring than their competitors.<sup>13</sup>

The third, and most important, misconception concerns the relationship between Darwinian biology and uniformitarian geology. The notion that evolution is uniformitarianism applied to biology is wrong.<sup>14</sup> Uniformitarianism is one of the most important unifying concepts in the geosciences. This theory suggests that the landscape developed over long periods of time through a variety of slow geologic and geomorphic processes. This term was first used in 1832 by William Whewell to present an alternative explanation for the origin of the earth. The prevailing view at that time was that the earth was created through supernatural means and had been affected by a series of catastrophic events such as the biblical flood. This theory is called “catastrophism”. James Hutton, a Scottish geologist, presented evidence that the earth had a long history and that this history could be interpreted in

terms of processes currently observed in 1785. He suggested that supernatural theories were not needed to explain the geologic history of the earth. Charles Lyell supported Hutton's ideas in his three volume publication "Principles of Geology" (1830 – 1833). He presented a variety of geologic evidence from England, France, Italy and Spain to prove Hutton's ideas correct and to reject the theory of catastrophism.

Darwin used this theory of uniformitarianism to shape his theory of evolution. His theory is based on the principle that the diversity seen in the earth's species can be explained by the uniform modification of genetic traits over long periods of time.<sup>15</sup> Lyell deemed Darwin's hypothesis completely unsupported by geological evidence. Lyell maintained that there was a direct parallel between the history of the earth (geology) and the history of life on earth (biology). Further that if the geology of the earth remained unchanged, then it followed that the biology of the earth would remain unchanged. In fact, the catastrophism propounded by the geologist Coneybeare was far more compatible with evolution. If, in fact, the earth had undergone "successive development", and biological history mirrored geological history, a progression of organic forms is what one would expect to find in natural history. The opinion of catastrophist geologists was that the marks of each great revolution in the history of the earth were to be found in successive batches of new fossils in the paleontological record. Darwin had used Lyell's uniformitarianism as his method of studying nature. The geological evidence for his theory, however, was provided by the progressivist paleontologists of the catastrophist school such as Agassiz.<sup>16</sup>

What was it in Darwin's theory that challenged the contemporary theological constructs of the day? Surprisingly, the doctrine of scripture was not the crucial issue. Conservative theologians had already developed strategies of hermeneutical accommodation in order to understand the Genesis narrative in terms of a long-earth assumption of geology.<sup>17</sup> This concept of "long-earth" or "deep time" is important in our discussions as it presents nature as an immense story with a narrative disposition.

Rather, the challenge was, and remains, Darwin's theory of natural selection which offers a thoroughly non-teleological means of explaining natural history. Darwin offers a means of explaining organic evolution that required no recourse to the idea of a design or designer.<sup>18</sup> This was a problem for the evangelicals in science. It was not that Darwin challenged the authority of the Bible (Darwin grew up in and maintained a Unitarian theology), it was that he attacked the doctrine of design. Darwin never meant to write atheistically.<sup>19</sup>

Hence, the theological threat was felt on this philosophical level. Darwin challenged the Victorian understanding of the character of the universe and of "man's place in the natural order".<sup>20</sup> The possibility posed by Darwin, that human beings and apes have common ancestors, aroused popular controversy. Many Christians believed that this assertion dislodged mankind from the privileged position of being created in the very image of God.<sup>21</sup>

Religious and scientific folk alike agree that the theory of evolution leaves many questions unanswered. Further, Darwinian science does not spring forth from a vacuum, it makes several grand assumptions and takes for granted at least three generic cosmological features that make evolution of life possible.<sup>22</sup>

First, biological evolution requires a universe that is open to accidental and novel combinations of chemicals that permit a spontaneous origin of life;<sup>23</sup>

Secondly, nature must possess a set of invariant and inviolable physical constraints such as the laws of physics and chemistry. Without the stability and predictability provided by nature's lawful routines, there would be no way for life to take hold and persist.<sup>24</sup> This allows the novelty of evolution to emerge and become actualized.

Finally, the Darwinian process requires a vast amount of time, which marks the universe with historicity. After Darwin, and especially after Einstein, nature has become an immense story with a narrative disposition. Consider that these three background ingredients must be present before the Darwinian process can begin and that nature is already composed of the stuff of narrative before the evolution of life can occur.<sup>25</sup>

Such an understanding of the teleology of evolution allows room for the "why" questions to be asked. Why would God create such a world? Haught points out that perhaps the promise of an eventual emergence of life and evolution was already present at the cosmic dawn. Perhaps the "meaning" of the universe's narrative character is, in part, that it allows for the unfolding of an enormous promise.<sup>26</sup>

The "Darwinian Continuum" is established; positions range from one end of the spectrum to the other; from the evolutionary school of thought sans God the designer; to the creationist school of thought which embraces God the designer; and the scientific – Christian go-between. We will see that even within all of the positions along the continuum, scientists and theologians struggle to present the new philosophy of science which Darwin's theory has wrought.

It is this writer's position that a theological conviction that the cosmos is endlessly intelligible and purposeful works well with science. A theological conviction also shatters the pretense that physics can capture the mind of God or that Darwinism can give us the deepest understanding of life.<sup>27</sup> Such a narrative understanding of the universe allows for a teleological understanding of the work of God and can remove the "us and them" confrontational approach to science and religion. This approach, however, has not been embraced by our scientific community.

It is important to consider the position of the great nineteenth century Darwinian debates which support the assertion of Charles Hodge, a Calvinist, that "the theory of evolution can be interpreted in a theistic as well as an atheistic manner."<sup>28</sup> These debates took place during a genuine crisis of faith in Victorian England. From 1830 – 1880, an economic cycle of overproduction, recession, unemployment and urban starvation occurred. Many citizens began to have serious doubts about the viability of the Victorian social structure. One shift in social structure was the increasing important and social status of the scientist, at the expense of the heretofore venerated leaders of the church.<sup>29</sup>

Hence, the Darwinian episode represents only one element in the ongoing cultural conflict of this time. A conflict focused not so much on the details of Darwin's theory than on the role science was to play in the future of human society.<sup>30</sup> This issue of a new philosophy of science is still debated to this day. Darwin had opened up to science the task of addressing the purposeful "why" questions and not just "how" questions. This is because, unlike

most other sciences, evolution requires narrative or historical kinds of explanations.<sup>31</sup> Darwinian science, nor any other sciences can tell us “why” nature is constituted in such a way as to allow the universe to evolve. Indeed, the decision of scientists to not deal with the question of purpose reveals why science alone is unable to find a purpose in the universe.

The warfare model of conflict between science and religion had grown out of the quest for liberation and intellectual freedom experienced during the Enlightenment. And the warfare metaphor is certainly characteristic of the debates spawned by Darwin’s “Origin”. David Livingstone points out that this notion of a death-struggle between science and religion has captured the popular mind, resulting in the image that an evangelical evolutionist must be either “intellectually deviant or historically aberrant.”<sup>32</sup> He further notes that this conflict model is a crude tool for the reconstruction of the historical relationship between science and religion. For example, this approach does not do justice when considering the emergence of the modern experimental method and that the growth of scientific endeavours grew out of, and was closely associated with, the spirit of Puritanism.<sup>33</sup> The results of this “black and white” , “right or wrong” antagonistic approach to interpretations of Darwin’s theory are evident in the post Darwinian debates. Such an approach limits the science of Darwin and Christian belief, not allowing meaningful dialogue between these stances and promoting confrontation. We will see that such a stance is alive and well in twenty-first century debate.

During the first half of the nineteenth century, scientific research was conducted within a framework derived from natural theology. Natural theologians would argue that natural design points to a God who is purposeful, bountiful and beneficent.<sup>34</sup> This approach has a long history in the Western Christian tradition, back at least to the apostle Paul.

It was during this period that natural theology enjoyed its greatest heights of intellectualism. “Natural Theology” published by William Paley in 1802 presented his famous clock analogy. Just as a watch implies a watchmaker, so it is with nature. In nature, all of the adaptations of the animal world, adapting different animals to their different needs and fitting them in their environments implies a Grand Designer. It follows that natural science illustrates the very mind of the Creator.<sup>35</sup>

Advocates of Paley’s watchmaker analogy perceived the history of life and the history of the earth to be welded together. These natural scientists aimed to show how the different forms of life, revealed in fossil records, had been perfectly fitted to changing environmental conditions.<sup>36</sup>

Paley’s watchmaker analogy was not without its detractors from both the theological and scientific communities. Theologians from many denominations felt that even though natural theology contributed moral worth and intellectual value, at the end of the day very little about God’s ultimate purpose could be revealed. On the other hand, the scientific community struggled with the idea of a beneficent, all powerful Creator being responsible for the nastiness found in nature.

In pre-Darwinian Britain, the great Scottish divine, Rev. Dr. Thomas Chalmers emerged as the champion of the evangelical movement in the Church of Scotland. While Chalmers did not wholeheartedly commit to natural

theology as theology, he did remain convinced that divine design permeated the structure of the universe. Further, he remained convinced that science would help explain the nature of God's presence in creation. He held that the most compelling argument in nature for the existence of God, which was to be found in the universality of conscience, could pose important questions, even if it gave no answers.<sup>37</sup> We will see that this argument is alive and well to this day. For the practice of science, Chalmers presented a fitting framework in natural theology and urged that both the theoretical structure and its vocational rationale be grounded in natural theology's argument from design. At the same time, he had no objection harmonizing lengthy stretches of geological time into the Bible at the beginning of creation.<sup>38</sup>

In 1840, another evangelical Scotsman, a Victorian scientist, Hugh Miller, published "the Old Red Sandstone". This publication was the result of his years as a quarryman during which he amassed a very impressive collection of fossil fragments. This led him into uncharted intellectual territory in that this area of research, geology, lacked both basic nomenclature and scientific explanation.<sup>39</sup> This is another example of a theologian's contribution to science.

Miller's discoveries were on the frontiers of geological knowledge; he offered the first explanation of the organic history of the old Scottish Devonian sandstone strata. Miller felt he could see clear traces of an ideal plan in nature. His discoveries impressed upon him the necessity of "long-age" earth which brought him face to face with the possibility of an evolutionary history of life. Miller perpetuated mainstream pre-Darwinian scientific orthodoxy by refusing to consider this possibility. Still, he easily accommodated contemporary theological assumptions about the age of the earth to the findings of science. He asserted that belief in the great antiquity of the earth was the result of empirical investigation by geologists, not prior predisposition. In his eyes, the literal reading of Genesis had given way to the results of geological scientific investigation.<sup>40</sup> Chalmers would not consider such a departure from the literal Genesis story.

In 1856, Miller published "The Testimony of the Rocks" which contained a new approach to harmonizing the record of Genesis to the record of geology. Similar to the round earth or the heliocentric nature of the universe being dismissed as unscriptural, he likewise questioned his opposition as to the validity of their handling of scripture. He argued that Scripture intended neither to provide a scientific account of creation nor to teach the principles of science. He concluded that each day of the creation narrative represented vast periods of geological time, later known as the "day age" theory of the earth.<sup>41</sup>

John Fleming, a contemporary of Miller's, did not agree with the catastrophist school of geology, that is that the Mosaic flood had essentially determined the geomorphology of the earth. His critique of this opinion is uniformitarian; that geological change is caused by a gradual process rather than sudden upheaval. He did not believe this stance to be a separation of science from theology, rather he saw this as further contemplation of the wisdom of God's plan in nature.<sup>42</sup>

Livingstone contends that the harmonizing strategies presented by these evangelicals involved in early nineteenth century British geology are not untypical.<sup>43</sup> New World evangelicals were similarly involved in the

scientific endeavours of geology, and were eager to articulate the twin faith found in science and religion. Chief among the American devotees of Chalmers and Miller was Edward Hitchcock. In 1823, Hitchcock published the "Utility of Natural History" which contained geological demonstrations of the existence and attributes of God conceived in terms of the catastrophist framework.<sup>44</sup>

Like his contemporaries, Hitchcock had no problem in relieving any apparent tension between geological time and biblical time. He suggested either that the "days" could be interpreted figuratively or that a gap could be inserted between the first two verses of the Bible.<sup>45</sup> He maintained a catastrophist understanding of geohistory. He believed that detailed corroboration between the book of nature and the book of Scripture was desirable and possible.<sup>46</sup>

Hitchcock moved natural theology beyond the Paley mode. In "The Religion of Geology" he urged that the grand aim of science was not to elaborate direct biblical correlation, but rather to discover the laws of nature, laws which themselves led the mind to their heavenly Author.<sup>47</sup> His fundamental assumptions for reconciling Genesis and geology were shared by a great many scientists of the day.

Benjamin Silliman, a teacher and friend of Hitchcock's, exemplifies this. He extolled the wonder of God's universe and the virtues of useful science while allaying any religious fears about the new science by harmonizing Genesis and geology. He shared Hitchcock's concern about correlating the findings of geology to Mosaic revelation.<sup>48</sup>

The Swiss geographer, Arnold Guyot, published "The Earth and Man", a geographical testimony to the harmonies of nature and history that everywhere expressed the foresight and control of a beneficent Providence.<sup>49</sup> Guyot is regarded as having provided the impetus for geography to be considered a serious and independent science.

Matthew Fontaine Maury published the "Physical Geography of the Sea" in 1855. This book established a whole new field of scholarship in marine sciences, solidly founded on the Paleyan view of the world. His findings were all presented in terms of natural law guided by Providence.<sup>50</sup> It was a thoroughly empirical work with metaphysical reflections.

This was the pre-Darwinian world of thought into which Darwin's theory was introduced. Evangelicals eagerly participated in early nineteenth century science. In fact, their natural theology provided much of the style and idiom of scientific discourse in the period.<sup>51</sup> Evangelicals did not promote a warfare between science and religion.

Although their science was conducted within the natural theology frame of reference, some remained Paleyans, some adhered to the theory of uniformity while others promoted catastrophism. What was unifying in their work was the belief that the natural design of creation points to a loving, caring God acting with purpose, a teleological explanation. What was not unifying was that there was no evangelical consensus on the philosophy of geology.

Finally, evangelicals had little difficulty in adjusting their theology to the notion of a long earth history. Harmonizing theories were advanced, as we have seen. Christian geologists both encountered and accommodated the long age issue of the earth long before Darwin's theory was introduced. So, Darwin did not challenge this, nor

did Darwin create a crisis around the doctrine of Scripture. The transformation of the species would not be any greater an obstacle to an evangelical exegesis of Genesis than a long age history of the earth.<sup>52</sup> The teleological “why” question remains front and centre.

The scene for Darwin’s public hearing in Britain was set by the Huxley-Wilberforce debate. This took place in 1860 at the Oxford meeting of the British Association for the Advancement of Science. Samuel Wilberforce, the Bishop of Oxford, famously stated “If anyone were to be willing to trace his descent through an ape as his grandfather, would he be willing to trace his descent similarly on the side of his grandmother?”<sup>53</sup> Huxley exposed as utterly vacuous Bishop Wilberforce’s “science”, and with crisp clarity summarized Darwin’s theory, including a thumbnail sketch of salient evidence.<sup>54</sup>

It is difficult to know for sure what actually transpired as no written record was kept. This story was patched together from memory recall some thirty years later. Darwin even admitted that the scientific criticisms put forth by Wilberforce were fair. So, how has this encounter achieved such legendary status? One school of thought suggests that, while Wilberforce was entitled to his own scientific opinion, the later drive towards “scientific” or “professional” science meant that outsiders (ie, Christian evangelical natural scientists) were less welcome in the sacred halls of science.<sup>55</sup> Hence, the warfare stance is promoted and maintained. The British Association for the Advancement of Science wished to rid itself of its amateurish and unprofessional image advanced by such unscientific science. The British scientific ego was looming large.

Meanwhile, Darwin’s public hearing in the United States was far more carefully executed. It took place at the Boston Society of Natural History and involved William Barton Rogers (who would later become the first president of MIT) and Louis Agassiz (Harvard’s Swiss professor at the Lawrence Scientific School). These men were of comparable scientific stature. Even so, Rogers placed the stamp of his authority on the debate, clinching his arguments with a detailed interpretation of the New York fossil-bearing strata in response to the progressivist paleontology of Agassiz. Rogers established the point that the value of Darwin’s theory needs to be settled by scrutiny rather than authority (sic, of God), by science rather than dogma.<sup>56</sup> The black and white nature of these debates continue.

Objections to Darwin’s theory did not arise from religious quarters alone. From the standpoint of the science of the day, there were some major problems with Darwinian evolution. Fleming Jenkin, a Scottish mathematician and engineer concluded that individual variations could never contribute to the emergence of a new species. Darwin felt the impact of this criticism. In response he re-emphasized the importance of geographical isolation in the formation of a new species.<sup>57</sup>

Jenkin and William Thomson, Lord Kelvin, argued that the amount of geological time required for the natural selection process was simply not available. Darwin confessed that this was probably the most important criticism of this theory.<sup>58</sup>

St. George Mivart, an English anatomist, zoologist and Catholic, rejected the argument that natural selection could in and of itself provide a complete explanation of evolutionary history. He agreed that evolution of

organic forms had taken place and that natural selection did operate during this process. But what about the explanation of the survival of a feature once it had arisen? Natural selection was powerless to account for the origin of the feature in the first place. Further, the evolution of apparently useless features could not be explained by Darwin's strict principle of utility. Mivart pointed to an internal progressive force, guided by God, that served as the main impetus in producing new variations. Finally, others were more inclined to propose that changes in organic form were a result of a conscious response of creatures to environmental stimuli.

Gaps in the fossil record were also problematic for Darwin, especially the lack of intermediate fossil forms to date.<sup>59</sup>

We can see that genuine scholarly hesitations pertaining to the "Origin" were put forth by both the scientific school of thought as well as theological. While natural selection was not rejected "in toto", many of Darwin's proponents did embrace some version of evolutionary theory. Darwin listened to his opponents and struggled with presenting his theory in the most coherent way possible. In the end, he turned to a Lamarckian version of evolutionary theory.<sup>60</sup>

Jean Baptiste de Lamarck had proposed his own theory of evolution in the year that Darwin was born. His writings contained two elements which seemed to satisfactorily answer obstacles faced by Darwin. The first was the idea that an innate life force impelled evolutionary history, causing a progressive increase in organic complexity. It assumed an ideal chain of being linking the simplest organism to the most complex and emphasized a transcendent force in the process. Secondly, Lamarck posited that by the exercise of will, organisms could consciously and directly adapt themselves to their surroundings and pass the modification on to offspring. This doctrine came to be known as "the inheritance of acquired characteristics".<sup>61</sup>

Variations of Lamarck's approach were promoted in the United States under the label "Neo-Lamarckism". A number of factors impelled American scientists in this direction. First, his theory gave a dynamic impulse to the ideal chain of being. Next, it involved a direct, conscious response to the environment, allowed for a far more rapid evolutionary tempo, and resolved the problem of how variations actually arise. Finally, Lamarck's theory could also explain the retrogression and loss of organs more easily as it simply attributed atrophy to disuse.<sup>62</sup>

Biological Lamarckism reduced tensions between religion and evolution. The idea of an intrinsic life force was clearly teleological and provided some Christians with an evolutionary theory that could actively sustain their theological convictions.<sup>63</sup>

Lamarckian evolution also had social ramifications in that some used it in arguments which promoted direct intervention in the affairs of society. Convinced that the future course of societal evolution could be changed, policies for improving social conditions were supported. For example, programs for education reform and various environmental movements were supported, hoping that these improvements would accumulate in society generation after generation. On the other hand, "Social Darwinism" was used to scientifically justify unrestrained economic competition and policies of non-involvement, supporting Darwin's theory of "survival of the fittest".<sup>64</sup> This is an example of Darwin's theory being misconstrued.

Louis Agassiz was offered a Harvard professorship in 1848. Between 1835 and 1845 he had studied glacial formations in Switzerland, Central Europe and England, convincing him that there had been a continental ice age. His was a brilliant theory and provided an understanding of many of the geographical patterns of plant and animal life. He believed that the glacial period was a demonstration of divine power causing catastrophes. And it supported his belief in the fixity of the species as an ice age provided a physical barrier between the species of the past and those of the present.<sup>65</sup> He insisted that ancient and modern species were “permanent representations of a divine idea” and bore no genetic relationship to each other. So, the chain of being was linked by common structures, not common descent.<sup>66</sup>

Consequently, Agassiz became one of Darwin’s most ardent opponents. Darwin’s idea of transmutation of the species ran counter to his notion of fixity of the species. His doctrine of special creation promoted the idea that every race of mankind had been specifically created by God for particular geographical zones. Theologically, this doctrine allowed him a scientific defense of slavery and he used it to oppose interracial marriage. These views highlight the creationist claim that the theory of evolution bore a racist spirit and fostered racist sentiments.<sup>67</sup>

The Harvard professor of botany, Asa Gray, took on the challenge of Agassiz. He was thoroughly an evangelical and believed that to study nature was to probe the designs of God. On Sundays he taught a class of black boys.<sup>68</sup>

Gray had an uncompromising empirical approach to the study of nature and, because of this, Darwin discussed his theory of natural selection with him. Gray believed that Darwin’s ideas of transmutation could help him explain the distribution of plant species. He believed that the genera of plants in North America and Eastern Asia were descendants of a common flora that glaciation had pushed southward. These findings provided the occasion for a full-scale debate with Agassiz, symbolizing the confrontation between two entirely different systems of natural history, the idealist and the empirical. It was a watershed in the history of scientific method.<sup>69</sup> The philosophical approach of the idealist approach to natural history was pitted against the empirical. The empirical approach had great difficulty then, and continues to struggle with the insistence of a teleological philosophy pertaining to the theory of evolution.

When Darwin’s *Origin* appeared, Gray had no misgivings about Darwin’s theory and the doctrine of scripture. He felt that since the Bible was not a scientific text book, there was no need for “reconciliation”. And, there was positive moral value in that Darwin’s theory supported his distaste for slavery. Gray claimed that natural selection did not exclude design and that the results of adaptation was not blind chance but were due to the action of the Creator. In this way, Gray sensed the pressure point between Darwin and Christianity; the actions of the Creator in the design of the natural world provided a teleological explanation. Darwin did not agree with this harmonization. He was deeply perplexed about the amount of misery in the world.<sup>70</sup>

Debate amongst North American scientists was extensive and was uniform in that they had little difficulty in accepting that some form of evolution was compatible with evangelical Christianity. But that was where their uniformity ended. Some stuck rigidly to Darwinian biology, some with Social Darwinism and others promoted the

Neo-Lamarckian train of thought. The problem with Darwin, for the evangelical scientist, was not that he challenged the authority of the Bible, but that he attacked design and a teleological understanding of the universe.

On the theological side of the debate, Charles Hodge, Calvinist, proclaimed that “Darwinism is atheism” in 1874. In fact, Charles Hodge and the Princeton theological tradition played a formative role in the construction of modern conservative evangelicalism.<sup>71</sup> This is important for our discussions and so will be examined in the next few pages.

Hodge’s approach to science and theology assumed that true knowledge is based solely on fact gathering, data collection without prior recourse to theory. He quoted Agassiz to the effect that facts are sacred, revelations from God, whereas theories are mere speculations of a fallen humanity. And he remained convinced that the teleological argument was sufficient to establish the existence of God as an intelligent, voluntary agent.<sup>72</sup> Once again, the doctrine that all things in nature were made to fulfill a plan or design is paramount.

Hodge exhibited a genuine concern to marry theological reflections with scientific research. He was prepared to concede that if a long earth history was indeed factual, then the early chapters of Genesis should be interpreted accordingly. In the 1870’s he suggested the harmonizing approach that the term ‘day’ found in Genesis, be understood as the great geological epochs. This made any suggestion that the Bible was of human origin “utterly incomprehensible”.<sup>73</sup>

So it was Darwin’s ateleological approach to natural design that remained the stumbling block. Hodge believed that Darwinism was atheism precisely and solely because it was inimical to design.<sup>74</sup> Hodge held that evolution with design was Christian, but evolution without design was atheism; that the denial of design in nature is the denial of God, that Darwin’s theory does deny all design in nature and, therefore, his theory is virtually atheistical.<sup>75</sup>

At the other end of the spectrum is the evangelical McCosh who “set about to prove that the natural origin of species is not inconsistent with intelligent design in nature or with the existence of a personal Creator in the world”.<sup>76</sup> McCosh’s new idealism prepared the way for a religious understanding of evolution by showing the interconnectedness of all parts of nature and the presence of an immanent God. He established a wide gulf between animal and human intellectual capacity and left the matter of the formation of the human body an open question. He emphasized that the advent of human intelligence welcomed a new phase in evolutionary history.<sup>77</sup> He would stress the complementarity of religious and scientific accounts of the same phenomena. On the one hand, what could be ascribed to the workings of the Creator, on the other hand could be interpreted as the results of natural law; each account expounded the plans of the great Lawgiver in its own way.<sup>78</sup> He had little difficulty in accommodating the new theory of evolution to his version of argument from design. The ideas of plan and purpose permeated his design argument. In order to explain the misery, conflict and struggle found in this world, he felt that only in an overarching plan could it be seen that “there is order in the world, but it is order subordinating conflicting powers”. Order, beneficence and design were all to be detected in the evolutionary process.<sup>79</sup>

He approved of the notion that “psychical powers modify and strengthen development” and accorded the external environment a more active role, tending towards neo-Lamarckism.<sup>80</sup> His views were part of a Lamarckian renaissance in the United States. The compatibility of Neo-Lamarckism with idealism, a spirit of progress and emergent evolution made it appealing.

Hodge and McCosh, both evangelicals, had quite different appraisals of Darwinism. Hodge was really opposed only to a Darwinian theory opposing teleology. Their different appraisals stemmed from the way each framed their argument from design. For both of them though, the idea of a designed universe constituted both the foundation and fabric of a truly biblical philosophy of science. This approach remained central to the Princeton theological tradition.<sup>81</sup>

The Darwinian debates have continued into the twentieth and twenty-first centuries. The schools of thought and all of their variants along the Darwinian continuum remain; the materialist; the creationist; the Christian evolutionists. While the fundamental correctness of evolutionary biology is assumed, the question remains, can this approach amount to an adequate explanation of living phenomena? The vastness of the universe is now understood, can a scientific explanation alone speak to this?

This is an important question. While materialist interpretations of life still offer the most intellectually serious challenge to religious faith, a materialist philosophical interpretation of the universe and evolution are actually an obstacle to the advancement of science and our understanding of nature. Once the materialist approach attains the status of a general view of reality, of metaphysics, it becomes an impediment to the kind of open inquiry associated with science. Religious and cosmic literalism will not assist in this endeavor.<sup>82</sup> Such a flattening of understanding down to one explanatory level is not sufficient; many levels or dimensions require consideration. In fact, the main reason that science and religion appear to be in conflict is due to such a literalist approach; literalism places science and religion in direct competition, it is one or the other.

Stephen Jay Gould, American evolutionist, stated that science and religion can peacefully co-exist. He proposed that a “non-overlapping magisteria” (NOMA) structure could overcome any alleged conflict. Science and religion talk about two entirely different sets of topics; the realm of science being based on “factual knowledge” (“how” questions) while religion is based upon “values and meaning”<sup>76</sup> (“why” questions).<sup>83</sup>

Gould remained dubious as to whether religion can claim coherently that the universe is in fact purposefully directed by an ultimate, transcendent reality. He maintained that it is the “philosophical message” contained within Darwinism which is so difficult for folks to accept; that there is no purpose to the universe and that matter “is all there is”.<sup>84</sup>

Modern advances in gene and DNA research now impinge on these debates. The Oxford evolutionist, Richard Dawkins, claims in almost all of his books that we can learn the deepest truth about life only if we read it at the level of genes. This “genes eye” approach has become the fundamental way to read our life-story for Dawkins and, for him, therefore evolution must entail atheism.<sup>85</sup>

Dawkins believes that we are now in a position to say that it is 'selfish genes' that run the show. These genes will do anything to survive, no matter the suffering caused. He argues that blind chance and natural selection, working over long periods of time, can adequately account for life's creativity, design and diversity. He insists that Darwin's theory is so complete that it logically excludes any theological explanation of life. The right or wrong approach only for Dawkins, one must make a choice, either Darwin or God, but not both.<sup>86</sup>

Gould and Dawkins both impose a modern scientific expectation on pre-scientific texts (sic, the Bible). Biblical content is forced into scientifically shaped containers. Haught refers to this as a "hybrid" reading and states that such an approach is one of the most characteristic features of contemporary literalism. A "hybrid reading" entails a scientific reading of the universe at the level of atom and genes AND then jumping from a scientific reading level to that of a metaphysical level. To move from a scientific rendering of the way things are ("how" questions) to a theological or philosophical level ("why" questions). This is how the warfare or conflict model of the relationship between science and religion is maintained.<sup>87</sup> This writer maintains that science and religion explain different phenomena and so separate explanations are required. (The harmonizing attempts by some evangelical and Christian scientists have sought to diminish such confrontation.)

Haught proposes that the earth-story is narrative and is still in progress and that what we are dealing with is a reading problem;

How to read religious texts in the context of contemporary scientific cosmology;

How to read the universe against the backdrop of sacred texts and teachings of religion?

He further states that creationists read things with a biblical literalism while evolutionary materialists approach the world also with shallow reading habits. Both share an aversion to an understanding of their topics of consideration on many levels simultaneously.<sup>88</sup> Can the book of nature (sic, universe) and the book of Scripture be considered alongside each other, the Bible alongside the Darwinian, rather than an 'either-or' competitive model? And, is such an approach beneficial? Haught proposes that a "cosmic purpose" lies deeper than either Darwin or design; this purpose found in nature and religious revealing nature's promise. This is the meeting point of reading the book of nature (evolution) which is consistent with science and religious hope.<sup>89</sup> After all, it is the hope of understanding the universe which propels the scientist and their scientific endeavours; it is the hope delivered by faith which propels the believer forward in their lives.

Science and religion both take for granted that the universe is much deeper than it seems.<sup>90</sup> Humanity's quest to understand their reality and to give meaning to their lives takes us beneath the ordinary; distinct ways of "reading" the depth of science and religion can be unifying.<sup>91</sup>

Consideration of this approach reveals how Copernicus, Galileo, Darwin, Newton and Einstein have been good for religion and theology. The progress of scientific thought has helped religious thought abandon textual superficiality. In this way, theology has everything to gain from scientific discovery.<sup>92</sup>

Brandon Carter, a theoretical astrophysicist, articulated the strong and weak anthropic principle in 1973. "Anthropic Principle" is the philosophical consideration that observations of the physical universe must be

compatible with the conscious life that observes it. The “weak” anthropic principle referred only to anthropic selection of privileged space time locations in the universe. The more controversial “strong” form addresses the values of the fundamental constants of Newtonian physics. When applying the strong anthropic principle, we have only one universe with one set of fundamental parameters. The laws of nature and parameters of the universe take on values which are consistent with conditions for life as we know it rather than a set of values that would not be consistent with life on earth.<sup>93</sup> Such an approach makes sense of the universe for humankind. We can trust our observations, especially with the right instrument. Humans remain central in this philosophy, humans are making the observations.

Stephen Jay Gould claims that the stronger anthropic principle actually reverses known causes and effects. This critic cites the vast physical, fossil, genetic and other biological evidence consistent with life having been fine-tuned through natural selection to adapt to the physical and geo-physical environment in which life exists. In this way, life appears to have adapted to physics and not vice versa.<sup>94</sup> Science is in the driver’s seat.

Carter’s weak anthropic principle proposes that “we must be prepared to take account of the fact that our location in the universe is necessarily privileged to the extent of being compatible with our existence as observers.” For Carter, “location” refers to our location in time as well as space.<sup>95</sup>

The atomic theory and the corpuscular theory of light as updated by Einstein can be viewed as quantum theories of matter and electromagnetic radiation respectively. Since the introduction of Einstein’s theory of relativity and of quantum theories, quantum mechanics has branched out into almost every aspect of twentieth century physics and other disciplines. String theory being one example, which predicts a large number of possible universes, called the “backgrounds” or “vacua”. The set of these vacua is often called the “multiverse” or anthropic landscape” or “string landscape”. Leonard Suskind has argued that the existence of a large number of vacua puts anthropic reasoning on firm ground: only universes whose properties are such as to allow observers to exist are observed, while a possible much larger set of universes lacking such properties go unnoticed.<sup>96</sup>

Steven Weinberg believes the anthropic principal may be appropriated by cosmologists committed to nontheism, and refers to that principle as a “turning point” in modern science because applying it to the string landscape “may explain how the constants of nature that we observe can take values suitable for life without being fine-tuned by a benevolent creator”.<sup>97</sup>

Theology must find a way to “keep up with science”. A scientific theology is required wherein God can grow with scientific discovery. Our theological and religious instruction have failed to integrate the revelatory experience of a personal and promising God into an expansive cosmological setting.<sup>98</sup> The immensity of time and space which began with Copernicus, continued with Darwin, Hubble, Einstein and Hawking, can appear to have “swallowed up” narrowly human images of God.<sup>99</sup>

Haught proposes that there is no reason to separate the idea of an unfathomable principle of care, or an infinitely generous source of promise from the expansiveness and depth of a new creation story.<sup>100</sup> In this way, religious thought need not be afraid to engage the enormous universe of contemporary cosmology. Further,

considering that the cosmos is “a work in progress”, an inherently active and self-creating universe, an unfolding story, rather than strictly algorithmic explications of an inflexible set of laws, it is not inconceivable that this story is filled with promise.<sup>101</sup> In this way, theology can address this issue of purposefulness in the universe, the WHY of nature; “why should we bother to do science?”; “why is there any order in nature at all?”, alongside the “HOW” questions addressed by scientists.

The theology of the evolutionary theist allows for an explanation of Darwin at one level and theological readings at another. This layered approach of explanation can address the teleology of conscience and intelligence within the Darwinian order of the universe. Such an approach allows for ongoing scientific inquiry into other possible physical factors that, alongside of and complementary to Darwinian factors, can give us an even richer understanding of life.<sup>102</sup>

Our universe is worthy of such an explanatory role of theology which in no way displaces science. Rather, this can lead to levels of understanding that science alone cannot reach. Such a philosophy towards the scientific/theological relationship successfully provides separate entry points for discussion without competition between the two.

Darwin’s final message is that we are animals to whom everything is permitted, hence the nastiness found in nature; human and animal. I propose that humankind is now dealing with and reeling from the manifestations of this black and white approach. Darwin cannot account for the teleology of conscience and intelligence. Non-recognition of this important factor allows for human behaviours “just because I can”. Take, for example, the economic meltdown which began in 2008; the application of Social Darwinism, the Darwinian mantra of “survival of the fittest” (albeit misconstrued), applied to the world of economics. The classical view of the free market, left free to regulate and self-correct itself, has been shattered. Most major economic figures of the day did not see this crisis looming nor was it believed that such a crisis was even possible.<sup>103</sup> (Note: the probability theory of Blaise Pascal (1623-1662) in the Scientific Revolution strongly influenced the development of modern economics and social science.)

Once again, just as the viability of the Victorian social structure was in crisis in the Victorian England of 1830 – 1880, this global economic crisis has resulted in a crisis of confidence in one of the leading ideas of our life time; the pure free market does not work. And, economic professionals have largely failed to deal with this crisis, the remedy is simply not known.

Why is this economic melt-down an example of the results of the application of solely materialist thinking? Robert H. Nelson, Professor at the School of Public Policy of the University of Maryland states “the growing emphasis on rigorous scientific methods in economics dated to the 1930’s, had unfortunately not led to corresponding increases in economic understanding. Perhaps because these methods were not appropriate to the full complexity and the interdisciplinary (multi-layered) character of many economic questions”.<sup>104</sup> In short, economic theories do not go deep enough. Seen in historical perspective Friedman writes “there has been little change in the major issues occupying the attention of economists; they are very much the same as those Adam

Smith dealt with more than two centuries ago. Moreover, there has not been a major sea change in our understanding of these issues.”<sup>105</sup> Displays of technical virtuosity have become more important for many economists than the development of real economic enlightenment.

Frank Hahn, a leading British economist, asserts that in future economic research, it will be necessary to introduce “psychological, sociological and historical postulates”.<sup>106</sup> Indeed, may this writer be so bold as to add theological and philosophical considerations to Hahn’s list. (Such considerations are already inherent in Hahn’s inventory.)

Such a shallow rendering of economics leaves humankind vulnerable to the shallowness of the “let’s do this because we can” approach. The ‘how’ of the situation is determined and acted upon without any consideration of the ‘why’ of the situation. The question as to why should these actions be taken or why should these actions not be taken is simply not considered.

The economic meltdown displays the sins Jesus speaks of in Mark 7: 20-23; NRSV;

*“And he said, “It is what comes out of a person that defiles. For it is from within, from the human heart, that evil intentions come; fornication, theft, murder, adultery, avarice, wickedness, deceit, licentiousness, envy, slander, pride folly. All these evil things come from within, and they defile a person.”*

Without recourse to a theological / philosophical understanding of or approach to human behavior, humans are free to act without consideration to anyone but themselves. This illustrates Darwin’s final message that we are animals to whom everything is permitted. History provides examples of the results of such actions; the greed of the U.S. rating agencies which precipitated the economic disaster just discussed; and the greed and collusion of Enron executives which led to that economic and power grid fiasco as another example. The fallout from each of these “profit at any cost” approaches to economics is still being felt with the lives of many, many individuals forever altered and not in a good way. Finally, growing economic inequalities is resulting in a weakening sense of social cohesion which correlates with many social problems.

The Christian concepts of truth, trust and love have contributed to the power of capitalism and the consequent rise of addictive patterns of consumption. Interestingly, Jesus spoke more of greed than any other sin.

Similarly “scientism” is simply a too-shallow rendering of our search for truth. It leaves us vulnerable to the machinations of the human spirit without any guidelines. It has been claimed that theology has not kept up with science. This writer proposes that the scientific community likewise must allow science to keep up with theology. The scientific community has a responsibility to allow theologians and philosophers to speak and then to consider what is said. This can be dangerous territory. Consider the vicious reception handed “Mind and Cosmos”, authored by the philosopher Thomas Nagel. This book urges deep skepticism about evolution’s explanatory power and illustrates the perils of raising arguments against evolutionary intellectual orthodoxy. The war fare approach is maintained. Nagel argues that the main failing of evolutionary theory is that it fails to take into account for how consciousness fits into the natural order. Evolutionary theory does not go deep enough.

Professor Nagel, professor of philosophy and law at NYU, is an atheist. He is a skeptical philosopher, putting science in its place. There are not theistic claims in his book, he relies instead on traditional tools of logic, "common sense".<sup>107</sup> The response of the scientific community is an exhibition of the shrill polarity which continues to be observed on the "Darwinian Continuum".

The writer proposes that theology and science would each benefit from a more harmonious relationship. A good starting point could be the continuation of nature's character of ever increasing complexity and sophistication. This is agreed upon by both scientists and theologians. A new philosophy of science through theology is possible but serious dialogue by serious people is required. Meaningful dialogue can result in a tremendous good for humankind.

Let not our unwillingness to debate this be seen in a few hundred years from now as analogous to the Roman Catholic Church's condemnation of Galileo. The Roman Catholic Church, as well as the science offered by Roman Catholic scientists, have never completely recovered from this error.

No given scientific fact represents the whole of reality. The continuing philosophy of post-modern science which makes God a worldly creature, to bring heaven to earth as it were, is not adequate. We may have string theory, but the "Why" questions remain unanswered. Too many dimensions of our reality are not considered. Somehow, science must learn to deal with this empirical dissonance; not everything can be proven. We must learn to think differently in order to allow for the serious evolution of the philosophy of science so that a teleological philosophy of science can be considered. How creative, sophisticated, intellectual, scientific, progressive and rewarding! Theologians and scientists agree on this philosophical level. Let the post-Darwinian debates continue!

**GLOSSARY OF TERMS**

Definitions From the Thorndike & Barnhart World Book Dictionary

- Catastrophism:** The theory that certain geological and biological phenomena were caused by catastrophes rather than be continuous and uniform processes.
- Creationism:** The doctrine that all things were created by God substantially as they are now, and did not gradually evolve or develop;  
The doctrine that God immediately creates a soul for every human infant born.
- Materialism:** The belief that all actions, thought and feeling is made up of material things and not of ideas;  
The tendency to leave out or forget the spiritual side of things; worldliness;  
The ethical doctrine that that material self-interest should and does determine conduct.
- Scientism:** The tendency to reduce all reality and experience to mathematical descriptions of physical and chemical phenomena.
- Social Darwinism:**  
The application of the Darwinian theory of evolution to the origin, growth and development of human society.
- Teleology:** The doctrine that all things in nature were made to fulfill a plan or design.
- Teleological Argument:**  
The doctrine that teleology proves the existence of a creator.
- Transmutation:** The transformation of one species into another; mutation.
- Uniformitarianism:**  
The theory that geological change is caused by a gradual process rather than sudden upheaval.

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