

NATURAL THEOLOGY AND NATURAL HISTORY IN DARWIN'S TIME: DESIGN,  
DIRECTION, SUPERINTENEDENCE AND UNIFORMITY IN BRITISH THOUGHT,

1818-1876

By

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**William Buckland**

*"The evidences afforded by the sister sciences exhibit indeed the most admirable proofs of design originally exerted at the Creation: but many who admit these proofs still doubt the continued superintendence of that intelligence, maintaining that the system of the Universe is carried on by the force of the laws originally impressed upon matter.... Such an opinion ... nowhere meets with a more direct and palpable refutation, than is afforded by the subserviency of the present structure of the earth's surface to final causes; for that structure is evidently the result of many and violent convulsions subsequent to its original formation. When therefore we perceive that the secondary causes producing these convulsions have operated at successive epochs, not blindly and at random, but with a direction to beneficial ends, we see at once the proofs of an overruling Intelligence continuing to superintend, direct, modify, and control the operation of the agents, which he originally ordained."* – The Very Reverend William Buckland (1784-1856), DD, FRS, Reader in Geology and Canon of Christ Church at the University of Oxford, President of the Geological Society of London, President of the British Association for the Advancement of Science, Dean of Westminster.

## Dedication

To Adam and Abigail, in love

to Dale Johnson, in gratitude and appreciation

to L. Preston Barnes, *in memoriam*

to Noreen Myra McDow, in sympathy of understanding.

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## LIST OF ABBREVIATIONS

In reference notes, *CE* references Thomas Henry Huxley, *Collected Essays*, nine volumes (London : Macmillan & Co. 1893-1898).

## CHAPTER I

### INTRODUCTION



**William Whewell**

This dissertation concerns the history of design argument and natural theology in nineteenth-century Britain. Design arguments, as a general definition, attempt to prove or confirm the existence of God by providing evidence that the natural world is ordered, to some degree, according to a logically pre-existent plan or for a specifiable purpose. The difference between design arguments and natural theology is important although largely contextual, and it may be determined by whether the argument is restricted to a philosophical interest or is represented as an aspect of a larger theology.

Observing the logic of various design arguments is essential to this dissertation, but the proper subject is nineteenth-century British natural theology.

Until the 1960s, the historiography of natural theology had focused upon studying how seventeenth- and eighteenth-century utilitarian design arguments, which in their day had seemed to confirm a supernatural, special creation of the earth, had been displaced in the nineteenth century by the scientifically discovered "truth" of the earth's self-formation by natural processes of development and evolution.<sup>1</sup> This historiography of intellectual displacement was never entirely satisfactory because, at least in small part, of problems in correctly distinguishing naturalistic from divinely "guided" or "directed" development and evolution.<sup>2</sup> These distinctions are notoriously slippery because the meanings of "evolution" and "development" overlap and, more notably, the adjectives "guided" and "directed" do not distinguish between mechanical, organic and volitional forms of guidance and direction. These ambiguities have been tolerated (they remain prevalent today) because the general tendency of natural science to disprove or, at the very least, dispense with the claims of supernatural creation and immaterial direction seemed clear. Indeed, this clarity obtained very soon after the publication of Charles Darwin's *Origin of Species*, and it quickly led to a severe and general disparagement of supernaturalism in natural theology

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<sup>1</sup> A utilitarian design argument seeks to demonstrate that natural forms are designed to suit the uses they are discovered to have in their natural environments. Historically, prior to Darwinism, the best resource for utilitarian design arguments was the structure of plants and animals.

<sup>2</sup> Bowler, Peter J. *Fossils and Progress: Palaeontology and the idea of Progressive Evolution in the Nineteenth Century* (New York : Science History Publications, 1976), pp. 15-46, especially called attention to distinctions between evolution, development, and direction in the history of science.



that was as much theological as scientific and philosophical in impetus.<sup>3</sup> In view of so much that is plainly apparent, it has seemed harmless to gloss what are mainly considered to be the terminological difficulties of defining a precise, logical relationship between natural and theological forms of direction.<sup>4</sup>

My dissertation attempts to be more precise, as well as less disparaging of design arguments, by carefully attending to a type of direction, commonly called *superintendence*, which may and, for the purposes of this dissertation, will signify not only intentional and volitional direction but, most importantly, direction according to logically pre-existent plans of both action and form. A fair metaphor would be to a construction site superintendent planning, scheduling and directing work according to pre-existing architectural plans. The superintendent's and the architect's plans are distinct but related. Because

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<sup>3</sup> Darwin, Charles. *On the Origin of Species by Means of Natural Selection* (London : John Murray, 1859). George Campbell, the Duke of Argyll, *The Reign of Law* (London : Alexander Strahan, 1867).

<sup>4</sup> There are three historical and critical surveys of design arguments in the modern scientific era. The most recent, Michael Ruse's *Darwin and Design: does evolution have a purpose?* (Cambridge, MA and London : Harvard University Press, 2003) expertly and comprehensively discusses historical and contemporary design arguments in relation to Darwinian explanations of biological complexity. Ruse concludes "that natural theology is now gone," although the relation of natural theology to complexity and to a theology of nature is somewhat unclear (pp. 332-333). The earlier studies are L. E. Hicks, *A Critique of Design Arguments* (Charles Scribner's Sons : New York, 1883); and Robert H. Hurlbutt III, *Hume, Newton, and the Design Argument*, revised edition (Lincoln, NB and London : University of Nebraska Press, 1985). Hicks and Hurlbutt each distinguish design arguments based upon utility from design arguments based upon order, and each is highly critical of utilitarian argument. Their criticisms are grounded in a belief that utilitarian arguments historically committed two errors by presuming that utility may be directly observed and by presuming that utility in nature must be there by design. Correct procedure would require arguing from certain instances of order in nature to utilitarian design as that order's cause. Despite the persistence and certainty with which Hicks and Hurlbutt have brought this charge against historical utilitarian argument, however, not everyone agrees. The issues are fairly discussed in philosophical although not historical terms by Thomas McPherson, *The Argument from Design* (London and Basingstoke : Macmillan Press, 1972), pp. 1-13.

superintendence directs by intentional volition and with reference to two kinds of “plan,” it may be understood as a form of design argument – a natural theology.

### **Natural theology and nineteenth-century science**

In the nineteenth century, the existence of a determinate order in nature, variously understood, was presumable. Today, it is usually thought that the nineteenth century reconsidered the question of whether this determinate order had been specially created or had developed and evolved. A third option – much more important to the history of natural theology if not of science and religion – was whether there was not one determinate order in nature but several orders of different kinds that were related to one another by a divine superintendence intelligible to human reason as the unified plans of creation. Landmark documents of superintendental thinking were authored by William Whewell and Adam Sedgwick in the 1830s, 1840s and 1850s.<sup>5</sup> Of course, natural theological superintendence was another name for divine providence, but it was the philosophical and scientific intelligibility of superintendence that was immediately at stake, not the theology. If superintendental plans and actions were intelligible and made sense of the physical evidence, taken primarily from geology and paleontology, then perhaps they could be accounted as a “scientific” explanation of nature. Whatever it had been to previous centuries, nineteenth-century

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<sup>5</sup> Whewell, William. *History of the Inductive Sciences*, three volumes (London : J. W. Parker, 1837); *Philosophy of the Inductive Sciences*, two volumes (London : J. W. Parker, 1840). Adam Sedgwick, *A Discourse on the Studies of the University of Cambridge*, fifth edition (London : J. W. Parker; and Cambridge : John Deighton, 1850). “Whewell” is pronounced “Hule.”

natural theology, in the view of such men as Whewell and Sedgwick, was to be a philosophical or moral branch of science premised upon physical sciences concerned with the history of the earth.

As admitted into my dissertation, then, superintendental natural theology was not a providential theology lurking within science but a design argument that could be put to scientific test. I do not claim that superintendence always had this meaning but only that it did in significant instances. This was, for example, the line of thought exhaustively pursued by Whewell in his *History and Inductive Philosophy* of science, the twin peaks of superintendental thought that were epitomized as the more blatantly theological little book, *Indications of the Creator*. However, since the powers of divine superintendence exceeded the regularity of material determinacy, they could, of course, be dismissed by materialists as an appeal to miracle in science. Materialism, however, amounted to a philosophic presumption against divine superintendence and was not an easy line of thought to pursue in Britain at the time. Whewell favored the presumption of superintendence unless it could be proved inadequate to scientific explanation.<sup>6</sup>

To date, historians have underestimated the philosophic and scientific credibility of superintendental thought by emphasizing its religious and cultural bases. Superintendence has been made to seem very miraculous and is believed to have survived deeply into the nineteenth century for reasons of social and

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<sup>6</sup> Whewell, *History*, op. cit.; *Philosophy*, op. cit.; *Indications of the Creator: extracts bearing upon Theology from the History and the Philosophy of the Sciences* (London : J. W. Parker, 1845).

religious persuasion.<sup>7</sup> As long as this partial misunderstanding continues, historians must misunderstand the relative significance of natural theology, science and religion in nineteenth-century thought and society. The current view of superintendence as a social phenomenon ingrained with religious bias needs to be broadened by taking into perspective the potency of superintendence as a philosophical and, ultimately, a scientific design argument.

Subsequent to the historical studies of the 1950s, historians have been exploring ways of understanding natural theology that have not stopped at disparaging utilitarian design arguments. No historian today would accept that natural theologians of the nineteenth century before Darwin were as foolish in their acceptance of design as they were depicted to have been, for example, in the superseded histories of C. C. Gillispie and John C. Greene.<sup>8</sup> Historical interest has shifted to answering why arguments that seemed obviously to have been standing on shaky philosophical and empirical ground retained their hold on people's minds for so long. The answers always depend upon what person or group of persons is made the historical subject. For British evangelical Christians interested in science, for example, it was often literally unthinkable that the

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<sup>7</sup> Brooke, John Hedley. "The Natural Theology of the Geologists: some theological strata," in L. J. Jordanova and Roy Porter, eds., *Images of the Earth*, second edition, (British Society for the History of Science, 1997; 1978), pp. 53-74; and "Why did the English mix their Science and Religion?" in Sergio Rossi, ed., *Science and Imagination in XVIIIth-century British Culture* (Proceedings of the Conference Gargnano del Garda 12-16 April 1985), pp. 57-78.

<sup>8</sup> Gillispie, C. C. *Genesis and Geology: a study in the relations of Scientific Thought, Natural Theology, and Social Opinion in Great Britain, 1790 – 1850* (New York : Harper, 1959). John C. Greene, *The Death of Adam: Evolution and its impact on Western Thought* (Ames, IA : Iowa University Press, 1959).

world existed in any way other than as designed and governed by God.<sup>9</sup>

However, this was not a scientific and religious divide. Many men of science – including Darwin – had difficulty adapting their thoughts to a non-intentional view of nature.<sup>10</sup>

Moreover, the idea that nature developed and progressed had social and political ramifications that could strongly influence opinions on natural theology. Progressive development implied social change, and social change always threatened to be revolutionary in nineteenth-century Europe.<sup>11</sup> Therefore, at a time before British science was fully professionalized, the political implications of science were of immediate and personal consequence to anyone with an interest in science's public estimation. William Buckland's natural theology, for example, may have had less to do with his scientific and religious beliefs than with the place in which he was professing geology – Oxford University.<sup>12</sup> The London morphologist Richard Owen seems to have expressly tailored his views on natural theology to suit different urban and academic audiences.<sup>13</sup> It has been

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<sup>9</sup> Hilton, Boyd. *The Age of Atonement: the influence of Evangelicalism on Social and Economic Thought, 1785-1856* (Oxford : Clarendon Press, 1988).

<sup>10</sup> Gillespie, Neal C. *Charles Darwin and the Problem of Creation* (Chicago : University of Chicago Press, 1979). Nicolaas Rupke, *The Great Chain of History: William Buckland and the English school of geology (1814-1849)* (Oxford : Clarendon Press, 1983).

<sup>11</sup> Desmond, Adrian. *Archetypes and Ancestors: Palaeontology in Victorian London 1850 – 1875* (Chicago : University of Chicago Press, 1982); *The Politics of Evolution: Morphology, Medicine and Reform in Radical London* (Chicago : University of Chicago Press, 1989).

<sup>12</sup> Rupke, *Great Chain*, op. cit. pp. 21-27, 51-63, 233-40.

<sup>13</sup> Rupke, Nicolaas. *Richard Owen: Victorian naturalist* (New Haven : Yale University Press, 1993), pp. 60-69, 106-219 at 203-04.

suggested, also, that the importance of the theologically scientific *Bridgewater Treatises* was not their natural theology but the way they rendered science “safe” for public dissemination.<sup>14</sup> Natural theology was so deeply tied to personal and social fortunes in Britain that it is being asked seriously today whether Darwinism was fundamentally an idea in science or a broader social philosophy with the significant power of displacing natural theology by a secular, liberal, and scientific creed of social progress.<sup>15</sup> In this view, Darwinism and natural theology were not only opposed but also similar things: they were ways of legitimating competing social norms.

Over the past fifty years, studies into the social contexts of natural theology have revolutionized our historical understanding. It is no longer adequate to represent natural theology merely as design arguments of questionable standing; natural theology must be understood in its broader social significance in order to be understood at all. Nineteenth-century people were chiefly arguing not over the “truth” of a natural theological argument but over its social, religious and political implications.

Even so, it is my immediate concern to say that this revolution in our understanding has only partly led to an increased appreciation of design argument. I particularly refer, of course, to the logic of superintendental design,

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<sup>14</sup> Topham, Jonathan. “Science and Popular Education in the 1830s: the role of the *Bridgewater Treatises*,” in *British Journal for the History of Science* 25 (1992): 397-430.

<sup>15</sup> Ruse, Michael. *The Evolution-Creation Struggle* (Cambridge, MA : Harvard University Press, 2005); *Mystery of Mysteries: is evolution a social construction?* (Cambridge, MA : Harvard University Press, 1999).

which, it must be said, is even today hardly considered to have been anything more in its logic than an assertion of divine interventions into natural processes that would be otherwise subject to science. Recently, for example, John H. Brooke has listed four known types of nineteenth-century design argument, but superintendence is not one of them.<sup>16</sup> And despite Boyd Hilton's sensitivity to the importance of superintendence to some natural theologians because of their religious views, Hilton's studies have not attempted to persuade anyone to show greater respect for the intellectual merits of superintendental thought. In a recent passage, for example, Hilton notes Adam Sedgwick's view that God created natural forms by, in Sedgwick's words, "contriving a change of mechanism adapted to a change in external conditions." This is accurate, but Hilton shortchanges the superintendental view by his conclusion that Sedgwick and others, in Hilton's words, "had to believe this, otherwise all their other assumptions would have come tumbling down." This may be true, but had the superintendentalists no other grounds for their belief? They had. As a matter of fact, Whewell had not yet begun his *History and Inductive Philosophy* when Sedgwick expressed the view just quoted, and the century's most sensational controversy over "development," which was instigated by the publication of *Vestiges of the Natural History of Creation* (1844) and would elicit Whewell's *Indications* as well as major responses from Sedgwick, was more than a decade

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<sup>16</sup> Brooke, John Hedley. "Between Science and Theology: the defence of teleology in the interpretation of nature, 1820-1876", *Journal for the History of Modern Theology* 1 (1994): pp. 47-65. Brooke and Geoffrey Cantor, *Reconstructing Nature: the engagement of Science and Religion* (Edinburgh : T & T Clark, 1998), p. 160-61.

away.<sup>17</sup> The scientific arguments over superintendence were not already lost by the 1820s and 1830s, as Hilton may lead us to believe. In fact, they had not yet earnestly begun and, as I hope to show, had a long and interesting course to run.<sup>18</sup>

This is not meant to be critical of the historiography of natural theology as it stands. Rather, it is primarily a defense of the way in which my historical study may appear to look back to outdated studies of natural theology and science that were done in abstractly intellectual terms, and to seemingly neglect relevant and more recent research into the social context of science and religion that has been excellently provided by such as Brooke, Hilton and so many others. It has not been my intent nor, hopefully, my method to neglect anything. My subject and a decent respect for concision, however, demand that I attend to what is more immediately relevant in preference to what is more recently written. It may be at bottom that both natural theology and Darwinism were more social phenomena than natural philosophy. I am, in fact, strongly inclined to believe it. My inclination may hold a personal bias, however, because I believe that a thorough appreciation of social historical context, despite my apparently regressive point of view, will considerably aid my thesis, for reasons that I will specify in a moment. I do not believe, however, that very many historians today,

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<sup>17</sup> Chambers, Robert. *Vestiges of the Natural History of Creation*, published anonymously (London : John Churchill, 1844). James A. Secord, *Victorian Sensation* (Chicago : University of Chicago Press, 2000).

<sup>18</sup> Hilton, Boyd. *A Mad, Bad, and Dangerous People? England 1783–1846* (Oxford : Clarendon Press, 2006), pp 454-60, at 459.



with their heightened awareness of context, will find themselves reciprocally placed at risk of bias in favor of a recent history that attends strictly to the intellectual form of a design argument. Hence, my apologetic approach and hope that this will not be mistaken for negligence or critical attack.

My thesis is that nineteenth-century natural theology, as a matter of public religion and public religious discourse in Britain, was not opposed to or ended by Darwinian science; rather, natural theology became an aspect of scientific and no longer of religious discourse by arriving at its theological term within the history of nineteenth-century Darwinian thought. The immediate subject of my dissertation is superintendental and, more generally, "directional" design arguments in natural theology. The claim that superintendental and directional natural theology in the middle of the nineteenth century became more and not less scientific is my dissertation's basic point. I claim, also – although with important qualification – that the increasingly scientific character of superintendental design argument became characteristic of natural theology generally, although this resulted from a religious and theological loss of interest in natural theology no less than from the history of directional science and design argument. Moreover, natural theology as a public discourse suffered a great ablation under the pressures of emergent professionalism in science and theology. These several factors were in historical combination, so that, by approximately the time of Darwin's death in 1882, little but scientific discussion remained of what had once been an important aspect of public religion. In my

view, a dormant eighteenth-century tradition of utilitarian natural theology was revived early in the nineteenth century as a significant form of public religious discourse that was later transformed by the pressures of public controversy into a discourse increasingly private and scientific but no less theological. A correlative view is that nineteenth-century Darwinian thought was a part of the history of natural theology no less than of the history of science.

The great difficulties facing my thesis, at least by anticipation, are three, each stemming from important contributions made by the recent emphasis upon social context in intellectual history. First, my thesis, by focusing upon points of theological and scientific confusion, may seem to disappoint a recent and general expectation that science will be differentiated from religion more carefully today than it was in much earlier scholarship.<sup>19</sup> In particular, my attempt to view natural theology as an increasingly "scientific" argument runs counter to the emphasis upon emergent professionalism in nineteenth-century science that has received so much attention over the past twenty-five years.<sup>20</sup> It is clear, of course, that natural theology is not part of what is ordinarily considered today to be professional science. I believe, however, that natural theology was a form of scientific discourse from early in the nineteenth century, though it did not survive the transition to professional science.

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<sup>19</sup> Brooke, John Hedley. *Science and Religion: Some Historical Perspectives* (Cambridge : Cambridge University Press, 1991) pp. 53-81.

<sup>20</sup> Turner, Frank M. "The Victorian Conflict between Science and Religion: a professional dimension," in *Contesting Cultural Authority: essays in Victorian intellectual life* (Cambridge : Cambridge University Press, 1993), pp. 171-200.

Second, my thesis may seem to return to the now discredited view of intellectual conflict as a characterization of nineteenth-century science and religion.<sup>21</sup> Perhaps, however, a conflict that, as I maintain, began earnestly in public but transitioned into privacy is not a very severe reassertion of the conflict thesis. At any rate, I certainly am documenting a controversy that took place, largely in the language of science but also of design and theology, between different conceptions of what was meant by historical direction in natural history. Third, as mentioned, my thesis runs counter to today's emphasis upon social context as determinative and explicative of intellectual history. In this dissertation, I maintain that the history of superintendental natural theology may be appreciated only by attending as rigorously to natural theology's logic and evidence as to its social significance.

Those are the difficulties anticipated to a hearing for my thesis. However, it is my belief that they represent problems more of historiographical habit and procedure than of deep substance. It is important to acknowledge, to begin with, that the technically separate arguments for social and against intellectual conflict have in fact walked hand-in-hand over the course of recent studies in science and religion. The anti-conflictive views of James M. Moore, for example – who strongly argued in 1979 that there was no real theological conflict between science and religion – were in some ways challenged by and in other ways

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<sup>21</sup> Russell, Colin A. "The Conflict Metaphor and its Social Origins," in *Science and Christian Belief* 1 (1989): 3-26. James R. Moore, *The Post-Darwinian Controversies: a study of the Protestant struggle to come to terms with Darwin in Great Britain and America* (Cambridge and New York : Cambridge University Press, 1979), pp. 1-100.

dovetailed beautifully with a roughly contemporaneous study by Frank M. Turner that documented social conflict between new, rising aspirants to professionalism in science and their more gentlemanly scientific precursors, many of whom had been and were clerical by profession.<sup>22</sup> Today, the belief that there were social causes of troubles that seemed to have been only intellectual in their origin may be thought the great key to understanding nineteenth-century science and religion. I call this key into doubt, perhaps, by arguing for a type of public and intellectual controversy that became much less religious, much less public, and much more scientific **but no less genuinely theological** at that time. I fancy, however, that the social causes accepted by historians today as an adequate explanation for the manufacture of an apparent intellectual conflict where none existed will suffice to explain, as well, the apparent absence of conflict in a significant instance where intellectual disagreement was real. In the 1860s and 1870s, slightly different versions of Darwinian natural theology, with significantly different social implications, were being advocated by famously Darwinian “men of science” such as Asa Gray, Alfred Russel Wallace, Thomas Henry Huxley, and even Darwin. These disagreements were potentially no less inhibitive to the public aspirations of professional science than to the public reputation of theology, because they revolved around the implications for natural theology of very different and very unsettled explanations of evolution’s historical direction.

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<sup>22</sup> Moore, *Post-Darwinian*, op. cit. Turner, “Victorian Conflict,” op. cit.

A concrete example may help to solidify these overly elaborate abstractions. It is not uncommon today to find the cordial correspondence of Darwin with his collegial American acquaintance Gray mentioned as an instance of harmony between agnostic and Christian forms of "Darwinism."<sup>23</sup> Cordiality, however, must not be allowed to gloss the significant disagreements that existed between what Darwin and Gray thought was true of organic nature and the scientific prospects for Gray's view of "guided" evolution. Similarly, Wallace's mix of Darwinian science with spiritualist beliefs kept to scientific lines of thought that paralleled those of Darwin and Gray. Wallace, however, published his radical social and religious views and, in response, saw them very publicly dismissed as quaint quackery by Huxley, a man greatly concerned for science's public reputation and much angered by the unwelcome affiliation of science with spiritualism. The reasons for what passed between and around these four men, in public and private, cannot be adequately understood without appreciating that Darwinian science asked questions of natural theology that were only doubtfully answerable, at a time when natural theology was still of some public note. Nor will it do to expect, before our study commences, that today we know who was ultimately proved correct in yesterday's science. The problems of "direction" were subtle and long-lasting. They concerned problems of discovering nearly invisible evolutionary mechanisms and, in addition, they concerned the theological concept of divine superintendence understood not as the religious

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<sup>23</sup> Miles, Sara Joan. "Charles Darwin and Asa Gray Discuss Teleology and Design," *Perspectives on Science and Christian Faith* 3 (2001): 196-201.

affirmation of God's supernatural "control" over material processes but as a form of design argument, a philosophical natural theology that had a firm basis in the history of scientific thought.<sup>24</sup>

For a long time now, historians have been interested in the way social context has determined ideas in science. This determinative view may be exaggerated but is tolerably true; and, of course, social determinacy helps to explain what goes unnoticed by science as well as what and how things are positively explained. To the few men of nineteenth-century science expert in Darwinian explanation and theory, there were questions between Darwinism and design that had no definitive answer. This means, as is widely recognized, that Darwinism did not disprove God or natural theology, but the relationship between Darwinism and natural theology goes much deeper than that. Darwin changed forever the way natural theology would be done if it were to be done,

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<sup>24</sup> The problem of possibly superintendental explanations for physical phenomena is of contemporary and not merely historical interest. Although "superintendence" is not a term used in design argument today, nonetheless, what John D. Barrow has recently called the difference between the laws of nature and their outcomes, so that "knowledge of those laws may not allow us to deduce the permitted outcomes," is the kind of epistemological difficulty that allows for superintendental explanation in complement to physical science. Similarly, John Leslie has commented upon the philosophical problems caused "When even the distinction between 'God using physical laws' and 'God operating through miraculous acts of interference' becomes fuzzy...." If Barrow and Leslie correctly represent the conundrums of physical science today, then their difficulties are, I believe, closely analogous to those of directional and superintendental science and natural theology in the period of my study. That this similarity passes unnoticed is possibly explainable, in terms of my thesis, as a result of superintendental natural theology having reached its term in the nineteenth century as a form of scientific but no longer religious discourse that did not become an aspect of professional science. If my historical argument is sound, then the formal similarities of the problems in science remain today, although natural theological language is uncharacteristic of today's scientific discourse. John D. Barrow, "How Chaos Coexists with Order," in Niels Gregersen and Ulf Görman, eds. *Design and Disorder: perspectives from science and theology* (London and New York : T&T Clark, 2002), pp. 11-29. John Leslie, "The meaning of design," in Neil A. Manson, ed. *God and Design: the teleological argument and modern science* (London and New York : Routledge, 2003), pp. 55-65.

and before historians may understand what transpired between science and religion in the nineteenth century, they must understand, also, what natural theology was before and could have been after *Origin of Species*. It is important to understand the ways in which natural theology or, at least, design arguments may have but did not continue in post-Darwinian public discourse before we agree about the historical significance of natural theology's post-Darwinian public remission.

It is generally considered today that natural theology failed equally as a scientific and as a theological argument. In the terms of the subsequently differentiated professions of science and religion, I do not doubt that this is true. Natural theology's public remission, however, will require a different explanation if I am able to show by this dissertation that natural theology did not fail as a theology in an argumentative confrontation with Darwinian science; rather, it transitioned from a primarily public and religious form of scientific and theological discourse into the primarily private and extra-professional concern of a very few men of science. This was a cultural and intellectual change that also involved a change in the questions being asked by and of natural theologians. Stating this with fewer nuances, natural theology transitioned from a form of public religion into a very scientific theology at a time when to be at once "scientific" and "theological" was becoming professionally impossible and increasingly unwelcome in various public forums.

It is important to acknowledge that natural theology's transition from religious to scientific discourse was socially and professionally a counter trend. The larger trend, as historians have understood for fifty years, was to differentiate science from theology and to deem the latter a properly **religious** discourse. The argument that "natural" theology became **more scientific and less religious** asks important questions, then, about the relationship between natural theology and theology as well as between science and religion. Does the history of natural theology in the nineteenth century properly belong to the general history of theological and, more particularly, of Christian religious thought, so that it becomes inappropriate to discuss natural theology in only scientific terms? If that were true, my dissertation, which discovers a scientific theology within the history of Christian thought, would be stalled from the start.

### **Natural theology and Christian theology**

The long historical relationship between natural and Christian (or "revealed") theology is complex and, therefore, difficult to describe in general terms. In form and logic natural theology is a rational argument for theism, unaffected by the particular claims of religion. Nonetheless, natural theology was also historically expected to prove, along with the existence, some of the attributes of God, such as omnipotence and benevolence, which were thought to lend an initial philosophical credibility to specifically Christian claims concerning



creation and redemption.<sup>25</sup> It was sometimes said, along the same line, that revelation would be incredible without natural theology, or that natural theology was more certain than revelation. Theologians often demurred, however, and sometimes reciprocated by critiquing natural theology's own uncertainties and inadequacy to the transcendent nature of God, or by remonstrating that the emphasis upon natural knowledge encouraged indifference to matters of faith. Although natural theology was often useful against atheism and materialism when those philosophies threatened social currency, even this utility could lead to the seemingly self-defeating impression of natural theology as an admixture of religious with purely philosophical motives.

These observations may be understood to caution against historical generalizations concerning natural theology's relationship with religion and theology. The role played by natural theology within Christian religion and society was never perfectly settled. There are, however, two general points that may be admitted for the purposes of this dissertation. First, although nineteenth-century natural theology is today usually considered to have been an apology for Christian theology and for British social institutions, its relation to religious faith was actually somewhat problematic (faith, at its best, often is problematic) and, necessarily, natural theology's social expediency was correspondingly disputable.

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<sup>25</sup> The term "natural theology" still tends to carry this Christian association, and it is interesting today to contrast writings about "natural theology" to writings about design in the natural order. In comparing, for example, Manson, *God and Design*, op. cit., to James F. Sennet and Douglas Groothuis, eds. *In Defense of Natural Theology: a Post-Humean Assessment* (Downers Grove, IL : InterVarsity Press, 2005), the latter is much more concerned to make conclusions about order in nature into philosophical supports for Christian theism.

I do not mean only that historians may dispute how successful and valued natural theology was as religious and social apology. I mean also, and more especially, that the formal independence of natural theology's arguments, and its close association with modern scientific thought, sometimes led to conclusions that ran counter to apologetic interests. There is a danger that, if historians consider natural theology as apology but not argument, then we will see only what apologists saw.

My second general point, related to the first, is that the causes of natural theology's association with Christian faith were historical rather than logical or formal. Natural theology was fitted into Christian history and philosophy; it did not happen the other way around. It may seem correct to view natural theology as a social and religious rather than a philosophical argument, but if historians do this, then we risk seeing only religious and social projections. By taking the arguments seriously – as, for example, did David Hume in the eighteenth century, William Paley in response to Hume, and Darwin and many of his colleagues after Paley<sup>26</sup> – we may see natural theology as an integral aspect of modern philosophic and scientific thought that was not restricted to baptizing mechanical philosophy or providing a theodicy in justification of religiously supported social institutions. Indeed, the possibility that natural theology, as design argument, was more than dogma and apology provides the great hinge

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<sup>26</sup> Paley, William, *Natural Theology; or, evidences of the existence and attributes of the deity, collected from the appearances of nature* (1802). David Hume, *Dialogues Concerning Natural Religion* (1779).

upon which, hopefully, my dissertation will open doors to historical understanding.

Rather than being dogmatic or apologetic, I would prefer to say that the superintendential natural theology of immediate concern was a “scientific” theology. At no point within my dissertation’s historical period, however, would the idea of a scientific theology have meant a theology not religious. Although scientific theology was explicitly advocated by men as different as were Huxley and Hugh Miller, and although these two meant something very different by the terms, each would have agreed that any theology – even one that had a scientific form – was of religious significance. Each would have disagreed that religion dictated to science, or that science dictated to religion: the question, in a technical sense, was purely theological rather than mixed of science and religion. Each would have agreed, as well – although Huxley at first denied it – that a credible theology in the nineteenth century had to be adequately scientific. There was a concern, then, of natural theology, a form of theology that, in its technical or argumentative form, only science could support. The problem, for Miller and Huxley as for their time, was what to do with design argument, which, insofar as it was a philosophical argument concerned with the order of nature, had a place within science but which, insofar as it could be made into a natural theology, had a place within religion. This was especially true in the nineteenth century, when science was still thought of more largely as “natural philosophy.” Whether you avoided or engaged the scientific, philosophical, and theological

arguments of natural theology depended upon how you thought your line of argument would fare, not only in the argumentative sense but also with respect to ramifications of social context. Any particular “side,” however, was never only the side of science or religion. The Anglican natural theologian Baden Powell, for example, despaired of Miller’s science, and Miller despaired of Powell’s religion. Similarly, as already mentioned, Wallace despaired of Darwin’s materialism (he understood Darwinian materialism better than most), and Huxley despaired of Wallace’s science. It was always a question of what kind of science *and* what kind of religion. The disputes between science and religion were always, also, intra-religious and intra-scientific.<sup>27</sup>

The great advantage to historians of differentiating science from religion is that the intra-scientific and intra-religious aspects of nineteenth century “science and religion” debates become clearly visible. The example most pertinent to my dissertation, perhaps, is Nicolaas Rupke’s study of the nineteenth century geological school of “catastrophism” in England, which Rupke denies was catastrophist and refers to as merely the “English school” of geology. At least in part, Rupke’s point is that “catastrophism” is a term loaded with religious connotation. He believes that the natural theology of the catastrophists – and,

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<sup>27</sup> Considerable confusion concerning the correct form of Powell’s surname and christened name has been caused by an unusual family circumstance. Christened “Baden,” Powell’s large family by his third wife, Henrietta Grace Smyth, changed its surname to Baden-Powell in his memory following his death in 1860. Four children by Powell’s second wife, Charlotte Pope, also survived him and retained the Powell surname. Powell’s first marriage, to Eliza Rivaz, had been childless. Several of the Baden-Powell’s became notable public figures – such as Robert, founder of the Scouting movement. Nonetheless, Baden Powell was not surnamed Baden-Powell, and repeating this common mistake risks degrading the familial status of two wives and four children.

specifically, that of William Buckland – was not integral to their geological science but was a consequence of teaching geology at the English universities, especially at Buckland’s Oxford, where relating geology to a primarily textual and theological education was a paramount concern.<sup>28</sup>

Rupke’s study has superseded Gillispie’s *Genesis and Geology*, which had explained Buckland’s catastrophism as “descriptive science ... enlisted into the service of natural theology.” Of course, this “service” fitted within Gillispie’s larger belief that natural theology was in the service of religion. A little further on in the same paragraph, for example, Gillispie wrote of science’s service to natural theology that “There was always the fundamental point of design, of course, but beyond that ... geology now offered new and specific evidence for the recent creation of mankind and for the historical reality of the flood. These were the essential points, both in Genesis and in geology.” In this sentence, unfortunately, Gillispie has confused what Rupke’s history wonderfully differentiates – the textual concerns of religion from the physical concerns of science and design argument. Buckland understood that the two were logically separate but actually nearly related at Oxford. It is unsurprising, then – although noteworthy – that in his inaugural geological lecture, *Vindiciae Geologicae*, Buckland parceled his discussions of natural theology and revelation into separate but adjacent sections. The point of the lecture was that problems created by geology for literalist interpretations of scripture would be offset by gains taken from geology

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<sup>28</sup> Rupke, *Great Chain*, op. cit. pp. 193-208.

into natural theology. Less emphasis was placed in the lecture upon geological evidence for the flood than upon establishing a balance between natural and revealed religion. Buckland's point becomes barely intelligible if we follow Gillispie into blurring the distinction between design and revelation.<sup>29</sup>

However, although Rupke's careful study clearly explained English geological science, it was less than complete as an understanding of the religion of the catastrophists, to which natural theology was more integral. In the 1820s and 1830s, Sedgwick at Cambridge followed Buckland in reasoning that the physical concerns appropriate to science ought to be kept apart from the study of texts. In fact, Sedgwick worked harder than Buckland to keep the so-called "scriptural geologists" from interfering with "philosophical" geological science in England. Although Sedgwick became increasingly evangelical during his long life and correspondingly more regardful of biblical texts, he never retreated on the importance of natural theology. He greeted Darwin's *Origin* with as much emotional disdain as he had *Vestiges* – although, remarkably, the hostility

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<sup>29</sup> Gillispie, *Genesis and Geology*, op. cit. p. 120. William Buckland, *Vindiciae Geologicae: or the connexion of geology with religion explained* (Oxford : Oxford University Press, 1820). Mott T. Greene has correctly described the balance that Buckland sought to maintain between revealed and natural religion, although, within his description, Greene has confused natural theology with diluvialism and the "Genesis and geology" controversy. See Greene, "Genesis and Geology Revisited: the Order of Nature and the Nature of Order in Nineteenth-century Britain," in Ronald L Numbers and James C Livingston, eds. *When Science and Christianity Meet* (Chicago : University of Chicago Press, 2003), pp. 139-60.

toward Darwin was more personal (Darwin had been Sedgwick's student at Cambridge) and privately expressed.<sup>30</sup>

The point of these instances is that the differentiation of science from religion may bring clarity to the history of science in ways that need to be complemented from the history of religion. Historians of religion have been willing to offer that complement, but they are inclined to focus upon the same textual and peculiarly religious concerns that Gillispie had mistakenly presumed were a natural theologian's high allegiance. Pietro Corsi's study of the science debates at Oxford, for example, rarely discusses any technical points of science or design. Corsi's concern is with Anglican theological debates that took place over the relation of science to religion, not with the discoveries of science or the logic of design argument.<sup>31</sup> Similarly, J. R. I. Klaver's recent supplement to Rupke's study of the catastrophists is concerned with the relation of English geological science to "religious sentiment," not with the relation of geological science to design argument.<sup>32</sup> Gregory P. Elder, studying the development of a nineteenth-century Anglican doctrine of "providential evolution," expressly appreciates that Anglicanism's theological embrace of Darwinism was based upon the "scientific lacuna [of] an unknown cause ... responsible for the

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<sup>30</sup> Klaver, J. M. I. *Geology and Religious Sentiment: the effect of Geological Discourse on British Society and Literature between 1829 and 1859* (Leiden, New York, Köln : E. J. Brill, 1997), pp. 102-31.

<sup>31</sup> Corsi, Pietro. *Science and Religion: Baden Powell and the Anglican Debate, 1800-1860* (Cambridge : Cambridge University Press, 1988).

<sup>32</sup> Klaver, op. cit.

mutation of species ... [that today] leaves providential evolution in an embarrassing discomfort in regard to the existence of chromosomes.”

Nonetheless, Elder does not discuss the scientifically informed considerations of directional evolution and of directional natural theology that were contemporary to the development of a theology of “providential evolution” and that, perhaps, could have prepared the way for a chromosomal consideration that never took place.<sup>33</sup> Again, Mark A. Noll and David N. Livingstone, in their excellent introduction to their new edition of Charles Hodge’s *What is Darwinism*, acknowledge that understanding or, at any rate, defining the relationship between Darwinism and design remains today, no less than in Hodge’s day, “a critical decision.” That acknowledgement, however, does not prepare students of history to understand the difficult intellectual engagement that took place when Gray, Darwin’s scientific colleague and an expert natural theologian, reviewed Hodge’s book. Although Hodge understood very well the theological implications of Gray’s design arguments, he understood only partly the science behind Gray’s defense of Darwin. On the other hand, Gray was hindered in his arguments by uncertainty among Darwinians about exactly what was Darwinism. It therefore became, as Noll and Livingstone note, a question of controlling definitions. Hodge and Gray would not agree upon whether Darwinism was atheism for

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<sup>33</sup> Elder, Gregory P. *Chronic Vigour: Darwin, Anglicans, Catholics, and the development of a Doctrine of Providential Evolution* (New York, London : University Press of America, 1996), at p. 184-85.



reasons that went well beyond any inquiry after truth, whether scientific or theological.<sup>34</sup>

Noll and Livingstone's consideration of Hodge and Darwinism, with its intense focus upon the importance of controlling definitions in public discourse, brings me back to the emphasis placed upon social context by today's historians. However, I hope that I will now be able to make my own position clear in relation to the historiography of social context. When I wrote earlier that it "may seem correct to view natural theology as a social and religious rather than a philosophical argument but, if historians do this, then we risk seeing only religious and social projections," I was somewhat anxious that this should seem contrarian. The word "projections" was, perhaps, somewhat affronting, as if I, in comparison to others, intended to escape contextual and personal limitations and see the truth. What I hope and intend is more modest. My claim will be that it was natural theology's changing social significance – rather than the usual three suspects of natural theology's intellectual bankruptcy in the face of Darwinian science, the new differentiation of scientific from theological discourse, and the advent of science and secularism in displacement of traditional religion in public life – that caused natural theology's remission from public discourse. Although I attend very carefully to the arguments of direction and superintendence throughout the dissertation, this is not because superintendence existed above

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<sup>34</sup> Hodge, Charles. *What is Darwinism? And Other Writings on Science and Religion*, ed. Mark A. Noll and David N. Livingstone (Baker Books : Grand Rapids, Michigan, 1994), "Introduction: Charles Hodge and the Definition of 'Darwinism'," pp. 11-47, at p. 46-7.

context, but because superintendence must be seen as a design argument that perdured into the time of Darwin if it is to be understood as something affected by the social history of the Darwinian era. What needs to be shown about superintendential natural theology's transition from a discourse in public religion to a discourse of private science is **that it happened**, not why. The problems of why it happened would, I believe, return us to social history with a vengeance and with new questions to ask.

This provides, as well, the explanation of my dissertation's relation to the history of Christian thought. Although the men studied here are primarily men of science – as well as, in many cases, ordained Anglicans and men of Christian faith – this is because the science that supported the superintendential argument needs most to be understood. Were it not for that necessity, men of the theological caliber of Hodge and, to my mind even more interestingly, George Campbell, Duke of Argyll, would not have escaped the narrative so largely. Hodge and Argyll are late examples of men writing natural theology in response to Darwin and for general public consumption. Remarkably, in 1867 Argyll suggested that God's superintendence of natural history ought to be considered "superhuman" rather than "supernatural" because human activity was not incomprehensible to science.<sup>35</sup> Because I am attending to scientific rather than theological argument, I will encounter a similar suggestion made by Wallace, the Darwinian man of science. Remarkably, Wallace desired superintendence to be

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<sup>35</sup> Campbell, *Reign of Law*, op. cit. pp. 1-52.

considered “spiritual” and “scientific” rather than supernatural, theological or superhuman because, as we will see, there were significant differences of connotation. To Huxley, however, superintendence was only ever simple nonsense and plain supernaturalism because it was not physical science. As Noll and Livingstone would appreciate, how you defined superintendence was important to these public men, and, undoubtedly, an inability or unwillingness to agree upon a definition may partly explain superintendential natural theology’s public remission. However, I will attend not to these attempts at assigning definitions but to the design arguments variously defined, because, for as long as there were design arguments, the possibility remained of an argumentative relation to science, to natural theology, and to Christian thought, and a limit could be placed, as well, upon our human capacity to mistake definitions for critical engagement.

We begin with Buckland, Anglican cleric, geological professor, natural theologian and dean of Westminster, who glossed geological science and superintendential design argument as a way of vindicating the study of geology to men of letters at Oxford and, subsequently, to the British general reading public. Buckland’s *Vindiciae Geologicae* contains, perhaps, the first public expression of a fully superintendential natural theology. Although his superintendential argument was brief and the consideration of science perfunctory, others would treat these problems more and more thoroughly and in greater technical detail as the historical period of my dissertation wore on,

until, at last, nearly nothing but scientific questions remained amid the echoes of a significantly past controversy in public religious discourse.

## CHAPTER II:

### NATURAL THEOLOGY IN BRITAIN, 1818-1838: SCIENTIFIC THEOLOGY IN A LIBERALIZING ANGLICAN ESTABLISHMENT



**Adam Sedgwick**

My thesis, as previously stated, is that nineteenth-century natural theology, as a matter of public religious discourse in Britain, became an aspect of scientific and no longer of theological discourse by arriving at its theological term within the history of nineteenth-century Darwinian thought. Two converging arguments will sustain the thesis: first, that directional and superintendental design argument became increasingly scientific during Darwin's lifetime; second,

that natural theology became increasingly marginal to public religious and theological discourse at the same time. Taken together, these make it possible to say that natural theology reached its theological term as an aspect of Darwinian scientific thought rather than of religious discourse.

My thesis works with constant reference, then, to the history of science and religion in Britain. Nonetheless, it is crucial to remember – and I must beg my readers to constantly recall – that I intend my dissertation as a contribution to the history of natural theology and not to the histories of science and religion at large. Since the 1960s, studies in the history of science have done much to integrate generally directional and, especially, geological catastrophist science into the history of developmental and evolutionary science in Darwin's time; and upon this body of research my own work will heavily and straightforwardly depend.<sup>1</sup> The only difficulty, with respect to the history of science, will be to maintain the relation of directional science to superintendential design argument correctly, because adopting the language of superintendence removes direction at once from scientific into natural theological discourse and, through natural theology, into contact with broader theological issues.

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<sup>1</sup> Cannon, Walter F. "The Uniformitarian – Catastrophist Debate," *Isis* 51, 1 (1960): 38-56; "The Basis of Darwin's Achievement: a reevaluation," in *Victorian Studies* 5 (1961): 109-34. Reijer Hooykaas, *The Principle of Uniformity in Geology, Biology, and Theology: Natural Law and Divine Miracle*, (Leiden : Brill, 1963). Martin Rudwick, *The Meaning of Fossils: episodes in the history of paleontology* (London : Macdonald, 1972). Bowler, *Fossils and Progress*, op. cit. (Ch I, note 2); *The Eclipse of Darwinism* (Baltimore : Johns Hopkins University Press, 1983); and *The Non-Darwinian Revolution* (Baltimore : Johns Hopkins University Press, 1988). Gillespie, *Charles Darwin*, op. cit. (Ch I, note 10). Dov Ospovat, *The Development of Darwin's Theory: Natural History, Natural Theology, and Natural Selection, 1838-1859* (Cambridge : Cambridge University Press, 1981). Rupke, *Great Chain*, op. cit. (Ch I, note 10).

It is with reference to theological and religious history that my thesis becomes more difficult to delineate and control. As at any time, theological discourses during the historical period of my study had interests and significances peculiar to them; and these peculiarities are manifest within the natural theologies of my study. Even so, it is the scientific bases of these natural theologies – whether barely apparent or much elaborated – that is my principal concern. Along with this principal concern, however, the point must be made that superintendental natural theology was brought to public notice in Britain, although only in part, by men whose interest was to comprehend scientific knowledge and practice within existent theologies and religious institutions. This attempt to admit science into established religious discourses and religious social institutions was controversial from the start, more for social, political and religious than for scientific reasons. As the scientific explanations for the general direction of natural history became more difficult and doubtful – this began about 1830 with the publication of Charles Lyell's *Principles of Geology* and continued beyond the historical period of my study – a new controversy over the scientific standing of superintendental natural theology entered into existing theological controversies over the social and intellectual relationships between science, natural theology and religion.<sup>2</sup> Because the theological controversy predated the scientific, it is not necessary to posit scientific knowledge as an original cause of theological troubles. Rather, scientific knowledge became

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<sup>2</sup> Lyell, Charles. *Principles of Geology*, 3 volumes (London : John Murray, 1830-33).

entangled within a theological controversy that had always been concerned for the significance of science for religion. In addition, these controversies in science, religion and natural theology were always a part of the much larger issues of liberalism and reform that occupied a considerable portion of British political, social and ecclesiastical attention before the 1840s.

My task in Chapter II is to show how nineteenth-century superintendental natural theology, which began as hardly more than a footnote to the published version of a geological and religious lecture given at Oxford University in 1819, came to play an important part in an extended and very public controversy over natural theology's significance for religion.<sup>3</sup> In so beginning my dissertation's argument, it is important to bear in mind the limits of my argument's burden. Understanding the relationships between nineteenth-century science, religion, politics and society is a huge task that has claimed a significant part of the attention of historians recently. My task, however, is not to explain those relationships but to allow for their influence upon that small portion of discourse in natural theology that was written by men expert in and concerned for practical science. These men held different views about science, religion, liberalism and reform, and it is part of my obligation to represent their views correctly. It must not be supposed, however, that these men are my dissertation's topic, or that my task is to add to our knowledge of them. Rather, my task is to bring recent scholarship to a consideration of a particular argument in natural theology: the

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<sup>3</sup> Buckland, *Vindiciae*, op. cit (Ch I, note 29).



argument that the general direction of natural history had a superintendent cause.

Even so restricted, the task of my dissertation is dauntingly large, and managing it has required some difficult choices and, perhaps, compromise. There is an absolute omission, for example, of important figures such as William Herschel, David Brewster, Joseph Dalton Hooker, William Carpenter and William Thompson. Such omissions are not fatal so long as the men selected for study are adequately representative. Further, what chiefly qualifies a representative is his explicit and expert consideration of the scientific bases for superintendential and directional design argument. My select group – principally Buckland, Sedgwick, Whewell, Powell, Huxley, Gray (although American) and Wallace – were clearly expert and are sufficiently well studied to enable connections between my dissertation and the greater historiography of science and religion. In large measure, my emphasis – beginning in Chapter II and maintained throughout – upon liberalism, Anglicanism and natural theology as a discourse in public religion reflects the topics most pertinent to the study of my select group. These aspects of nineteenth-century British social history are used to help characterize superintendential natural theology at the time. I make no effort to reverse the argument and view superintendential natural theology as characteristic of larger social, religious and political issues.

The subject of my dissertation is superintendential and, more generally, “directional” design arguments in the guise of “scientific” natural theology. Each

of the general terms of my subject – “science,” “design argument” and “natural theology” – is large subject in itself, and it is necessary to be clear about the limits and specifics of my particular concern. A design argument taken separately from larger theological issues is not usually considered to be natural theology and, conversely, it is fairly ordinary for natural theology to be seen presuming rather than arguing for design in nature. Moreover, what counts as an “argument” is not always easy to tell, because casual comments will often suggest more argument than they provide. This last point is especially remarkable here, because I contend in Chapters II and III that nineteenth-century superintendental natural theology began as a very bare argument that became increasingly detailed and scientific as the evidence for a developing and evolving natural world became increasingly convincing and apparent to the British reading public.

In order to sustain this contention, it is necessary to be as clear as possible about what will mark or brand design argument and natural theology as “scientific.” Chiefly, I understand this mark to be some degree of explicit discussion, in the practical terms of contemporaneous science, of the probable causes for the general direction of the earth’s historical development from a primitive to a more complete and complex state of being. The conviction that the development of the natural world had a definite direction was nearly universal in the nineteenth century, although, remarkably, its bases could be as different as the philosophical principles of materialism, idealism, spiritualism and theism. At

stake and in debate were the causes more than the fact of developmental direction; and theological superintendence was commonly supposed to be a probable cause. When that common supposition was referred to and, eventually, stated and discussed in the terms of physical science, then theological superintendence became a scientific argument.

The idea that God superintends the course of natural events obviously had a much wider reference at the time than to only scientific claims about the causes of directional development. In this wider reference, the belief that God superintends natural events was related closely to the theological doctrine of providence – to the belief that things happen according to God’s purposes. This wider, providential reference is very important to my argument but must not be confused with what I will refer to as superintendent design argument and natural theology. Within my dissertation, the meaning of superintendence will always have reference to a design argument claiming that the natural world is ordered to some degree according to an ideal and partially intelligible plan; and that, from the point of view of a natural historian, an evident theological superintendence over natural events has been directed to the realization of that plan. In other words, superintendence for my purposes means a design argument that was potentially demonstrable in terms of physical science. There is no reference to the wider belief – which may be also considered superintendential although with a larger, providential significance – that in the natural world things happened upon occasion that cannot be explained in terms

of physical science because they exceeded the possibilities of physical cause. Certainly, also, there is no reference to any understanding of causality that would negate the distinction of supernatural from natural causes, since such a distinction is indispensable to a superintendential view.

Keeping the two different understandings of superintendence from confusing one another is not a straightforward task, because the superintendential design argument did claim that causes essential to nature's proper development occasionally had exceeded physical limits. Famously among these occasional, supernatural causes was the creation of specific forms of life. Superintendence in both its providential and scientific significances, then, shared a belief in supernatural or supra-physical causality. They differed in that the scientific superintendentialists sought to make supernatural causes evident to reason according to scientific thought, while a providential superintendentialist needed to have no such concern.

Basically, a superintendential natural historian and natural theologian would claim that to make an allowance within physical science for the possibility that God had personally directed natural processes in forming the earth did not contradict the premises of physical science, any more than it contradicted, for example, archaeological science to accept human direction as a cause in the formation of historical artifacts. By analogy to human direction, then, the natural world was presumed by superintendentialists to be an artifact of sorts; and they expected the physical sciences to discover something about the manner in which

physical and, often presumably, “vital” forces had been directed by God to this definite end. It was not necessary for a superintendential natural theologian to maintain, for example, that the origins of life were incapable of scientific explanation. The essential thing was to discover natural forces, physical and vital, that required a personal and supernatural but intelligible direction to the end of originating specific forms of life.

In the 1980s, historians of science were brought to grappling with the importance of “direction” to nineteenth-century science in response to Peter Bowler’s seminal Darwinian studies.<sup>4</sup> In the history of philosophy, also, the philosophy of science that supported the superintendential view – specifically, Whewell’s philosophy of science – has received important reconsideration in recent decades.<sup>5</sup> In my judgment, it is not necessary for persons reading in the history of natural theology to be very familiar with these scholarly studies in the history of science and philosophy, except upon one point. Denoting directional ideas in science and philosophy as “superintendential” removes them rather pointedly into the history of theology. “Superintendence” was a significantly theological term that was intended for theological use when employed by nineteenth-century natural theologians. As a consequence, superintendence is a term largely avoided by historians of science and philosophy. Nonetheless,

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<sup>4</sup> Bowler, *Fossils and Progress*, op. cit.

<sup>5</sup> Fisch, Menachem and Simon Schaffer, eds. *William Whewell: a Composite Portrait* (Oxford : Clarendon Press, 1991). Richard Yeo, *Defining Science: William Whewell, Natural Knowledge, and Public Debate in Early Victorian Britain* (Cambridge : Cambridge University Press, 1993).

superintendence is the natural theological significance of certain forms of the directional science addressed by Bowler. Superintendence is a form of direction.

Superintendental natural theology had some history in Britain prior to 1818, the starting point of my study. It is not necessary for readers to be familiar with this earlier history, and, in certain respects, such a familiarity brings attendant dangers. At times in the eighteenth century, God's superintendence was equated to a constant energy that was thought necessary to keep matter in motion. Such a view, of course, completely misunderstands Newtonian inertia and may only detract from my attempt to give superintendence a scientific credibility. Isaac Newton and Colin Maclaurin, who were certainly credible Newtonians, considered, to take another example, that God's superintendence may be necessary to maintain a good order between intrusively elliptical planetary orbits as well as to hold motionless stars in their places. However, this Newtonian understanding of superintendence does not involve superintending the processes by which solar systems were originally formed. Bear in mind that, although Newton's appeal to superintendence eventually ran afoul of dynamical explanations for degrees of self-correction in planetary orbits, the misfortune of his and other eighteenth-century superintendental views does not impugn the significance of superintendental design argument as accepted into my dissertation. Indeed, to rehearse the many instances in which God's superintendence of the natural order has been explained away by physical

science does not at all serve my purpose, although I would not have readers be wholly unrehearsed in this matter, either.<sup>6</sup>

It must be chiefly born in mind that my topical superintendential design argument is defined as the personal direction or guidance of natural forces toward the gradual realization of an ideal or planned natural order. Since geology was the first truly historical physical science, it was impossible for superintendence, as I define it, to be “scientific” before it was proposed as an explanation for geological phenomena. I do not know of any historian that has taken theological superintendence more seriously with respect to geological and, later, evolutionary science than with respect to earlier views. I believe, however, that superintendence deserves some reconsideration in its significance for Darwinian thought and in the history of natural theology.

Chapter II will serve to show that, early in the nineteenth century, a rather commonplace superintendential view of natural history was newly supported by an illustrative or adductive (rather than an entirely non-demonstrative) geological design argument that was intended to represent geology as a contribution to natural theology and as an aspect of a broadly theological education. Later, the geological science behind this superintendential natural theology became a point of public controversy without losing its theological connotation. The first appearance of superintendential natural theology founded upon directional geological science marks the origin of my

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<sup>6</sup> Three historical surveys of design arguments pertinent to the history of science are referenced in Ch I, note 4; especially Hurlbutt, *Hume, Newton*, pp. 3-42.

dissertation's principal subject, and, therefore, I begin my study with the men chiefly responsible for bringing geology into natural theology – Buckland at Oxford and Sedgwick at Cambridge. It is equally foundational to my dissertation's argument to show, however, that this originally modest design argument became elemental to a much larger and more public debate about liberalism and reform in education, theology, and political and social life in Britain. The public expectation, pronounced by a significant few natural theologians and men of science, that the gradual formation of the earth would require a superintendential explanation brought science into theological controversy in such a way that points of physical science eventually became the chief characteristic of natural theology in public discourse.

### **William Buckland: natural theology and "Genesis and geology."**

William Buckland was born in 1784 into a family of Anglican clerics. He attended Corpus Christi College at Oxford, graduated in 1805, and was elected a fellow in 1808. Educated in the classics, science was his hobby. He was appointed Oxford's mineralogy reader in 1813 and the geology reader in 1818. Publication of *Reliquiae Diluvianae: or, Observations on the Organic Remains contained in Caves, Fissures, and Diluvial Gravel, and on Other Geological Phenomena, attesting the action of an Universal Deluge* (1823) brought him international recognition in science and forever associated him with diluvialism, the geological theory of a catastrophic flood that corresponded to the deluge



described in Genesis.<sup>7</sup> His Bridgewater treatise on *Geology and Mineralogy considered with reference to natural theology* (1836) gained him wider, public renown.<sup>8</sup> In the 1840s, he favored glacial theory over diluvialism but failed to persuade his geological colleagues to his new point of view. Despairing of a place for the natural sciences at Oxford and weary of controversy with the theological Tractarians there, Buckland quit the university to become Dean of Westminster in London in 1845. He died in 1856 after several years of a physically distressing mental illness.<sup>9</sup>

The first Oxford readership in geology was created in 1818 specifically for Buckland. It was intended to supplement his existing stipend as mineralogy reader and to enhance the standing of scientific education at Oxford, which had become the target of aspersions cast upon the university's reputation from Edinburgh and elsewhere.<sup>10</sup> Buckland was already known in scientific circles for his contributions to the development of stratigraphical tables and as a friend of Cuvier, the famous and conservative natural philosopher of Paris. A proponent of moderate educational reform and a political Tory after the mold of his friend Robert Peel, Buckland was committed to science as "a part of our established

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<sup>7</sup> Buckland, William. *Reliquiae Diluvianae* (London : John Murray, 1823).

<sup>8</sup> Buckland, William. *Geology and Mineralogy considered with reference to natural theology*, two volumes (London : Pickering, 1836).

<sup>9</sup> Buckland's biography is by his daughter, Elizabeth Oke Gordon, *The Life and Correspondence of William Buckland*, two volumes (London : Murray, 1894). Relevant studies are Rupke, *Great Chain*, op. cit.; and Klaver, *Religious Sentiment*, op. cit. (Ch I, note 30).

<sup>10</sup> Rupke, *Great Chain*, op. cit. pp. 21-23.

system of education” and to the “ingrafting ... of the study of ... Geology and Mineralogy, on that ancient and venerable stock of classical literature” that was taught at Oxford.<sup>11</sup>

Part of Scotland’s boast over Oxford was the separation of the study of science from religion at Scottish universities, and, consequently, part of Buckland’s mandate as the new geological reader was to justify the inclusion of science within a religious and classical education in England. Not everyone at Oxford was in favor of the reform. In the minds of many, science was associated with the politics and religion of the radical philosophers of France. It was dismaying to many, also, that Buckland and all credible geologists were insisting upon a vast natural history of the earth that was without mention in the classical literature. Additionally, many geologists in Scotland and elsewhere advocated a “quiet deluge,” denying that there was any geological evidence of the biblical flood and dismissing as scientifically irrelevant the textual evidence in its favor. Buckland, then, was under pressure to show how geology subordinated itself to establishment politics and classical learning. There was not much example for him to follow at Cambridge, where the Woodwardian chair in geology had produced hardly any lectures since its foundation in 1727 (although the appointment of Sedgwick in 1818 would soon change that.)<sup>12</sup>

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<sup>11</sup> Buckland, *Vindiciae*, op. cit. p. 2.

<sup>12</sup> Rupke, *Great Chain*, op. cit. pp. 21-7. Buckland, *Vindiciae*, op. cit. pp. 35-8.

Buckland gave an inaugural lecture on the founding of the new readership on May 15, 1819, which he entitled *Vindiciae Geologicae: or the Connexion of Geology with Religion Explained*. The lecture reflected his professional circumstances. He began by asserting an "imperative" to teach science at Oxford that was premised upon scientific advances being made in London and at most universities in Europe, so that "a competent knowledge" of the sciences had become common in Britain among "intelligent persons" and "even amongst the imperfectly educated classes of society."<sup>13</sup> He recommended geology as no less important to "pecuniary profit" than as a gentlemanly exercise of "the higher powers of the mind."<sup>14</sup> All together, about a quarter of the lecture was given to observing the importance of science and geology without the university, reflecting themes that would be touched upon again and again in the coming decades in justification of teaching science at Oxford.<sup>15</sup>

The fundamental purpose of the lecture, as the dedication in its published version prominently noted, was to show that "geology has a tendency to confirm the evidences of natural religion" and was "consistent with the accounts of creation and the deluge recorded in the Mosaical writings."<sup>16</sup> External pressures were forcing geology into Oxford, but these were the rationalist's accepted rubrics of continuity with religion: natural theology and the evidences of

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<sup>13</sup> Buckland, *Vindiciae*, op. cit. pp. 2-3.

<sup>14</sup> Ibid. p. 5.

<sup>15</sup> Ibid. pp. 1-10.

<sup>16</sup> Ibid. from the dedication page.

Christianity. Remarkably, however, it was not geology's confirmation of scripture and suitability to design argument that was most emphasized by Buckland. He meant, rather, to persuade his audience into admitting a greater regard for natural theology in religion. Only when that was achieved could Buckland use natural theology to emphasize the connection of geology to religion and soften the new science's contradictions of a literal interpretation of scripture, as he intended.

Buckland began by alluding to the contributions of geology to natural theology. The allusions were quaint, and none was quainter, perhaps, than his respect for the evaporation of sea water, which, Buckland noted, usefully left salt to preserve the purity of the sea while it distributed fresh water "in genial showers to scatter fertility over the earth." As a design argument this was insignificant, but it did serve to remind his audience of natural theology's benefit to a cultivated sermon. Buckland further promoted natural theology by referring to philosopher-theologians of acknowledged stature in Britain, such as Newton and Paley, whom he dutifully praised for their "heartfelt piety" rather than their contributions to knowledge. Similarly, the salutary effect of geology upon natural religion was sanctioned by quotes from John Bird Sumner, later the Archbishop of Canterbury, and the anti-revolutionary natural philosopher of Paris, Cuvier, whose geological theories were the foundation of Buckland's own. There was not much of an attempt to expound upon geological design. That was not the lecture's purpose. Buckland wanted, very simply, to advance the idea that

geological science was natural religion, and natural religion was safe politics and warm piety, acceptable at Oxford.<sup>17</sup>

The importance of recommending natural religion became clear when Buckland turned his attention to the connection of geology with scripture. He did not begin by attempting to reconcile the facts of geology to the biblical narrative. He conceded, without elaboration, "an apparent nonconformity of certain geological phenomena with the literal and popular account of creation," and sought to minimize the religious significance of this lack of conformity by affirming that the problem was "superfluous to ... those who knew the strength of the irrefragable moral evidence, on which the general authority of the sacred writings is established." The difficulty was restricted to those "who have not examined the [moral] evidences, and who look only to natural phenomena" in validation of scripture.<sup>18</sup>

The natural phenomena could not be ignored entirely, however, and Buckland maintained that "the evidence of facts unequivocally confirms [the Mosaic] records in all points of most essential importance; ...as, for instance, ... that *the existence of mankind* can on no account be supposed to have taken its beginning before that time which is assigned to it ... [and] the grand fact of an *universal deluge* at no very remote period...."<sup>19</sup> The geological confirmation of

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<sup>17</sup> Ibid. pp. 10-22.

<sup>18</sup> Ibid. p. 22-23.

<sup>19</sup> Ibid. p. 23-24.

scripture, however, was notably restricted to these twin temporal coincidences. Buckland did not suggest any further correspondence between natural and scriptural history on these or any other points.

Indeed, it was only in an appendix to the published lecture that geology's universal deluge was explicitly identified with the Mosaic flood.<sup>20</sup> Generally, their identity was left to be implied by their temporal coincidence. Any attempt to elaborate a physical correspondence would only have highlighted the fact that Buckland's geological catastrophe, which he envisioned as something like a great tidal wave, did not coincide very well at all with scripture in its descriptive details. Instead, Buckland reiterated his claim that geology has "added largely to the evidences of natural religion," and he suggested that it was not inconsistent with revelation to affirm that the world had existed differently from scripture prior "to the destiny or to the moral conduct of created man."<sup>21</sup> Stripped of its rhetorical strategies, then – and without suggesting that the rhetoric was unimportant – this was Buckland's connection of geology to religion explained: two temporal coincidences, the contributions of geology to natural theology, and the distinction of geology's interest in physical history from scripture's concern for moral history.<sup>22</sup>

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<sup>20</sup> Ibid. pp. 35-8.

<sup>21</sup> Ibid. p. 23, 25.

<sup>22</sup> Mott T. Greene has correctly noted the rhetorical balance that Buckland maintained between revealed and natural religion. However, in his account, Greene has confused natural theology with diluvialism and the "Genesis and geology" controversy, repeating a pervasive confusion among historians. For that reason, it is important to emphasize the logical structure of what Buckland was proposing, rather than his rhetorical intentions. See Greene, "Genesis and Geology

As meager as these connections to textual and traditional religion may seem, it is important to add that, still more meagerly, it is doubtful they extended much beyond a simple commitment to natural theology as an adjunct to the authority of classical texts. The reason is that the creation of humanity, the universal deluge, and the distinction between physical and moral history were all eventually made into parts of a very broad and historical design argument that stood impressively apart from any appeal to texts. Although Buckland made only a passing reference to this historical argument in his lecture, it became increasingly important over the next three or four decades, as the natural sciences became more independent of scriptural authority and more committed to the historical development of the natural world. By 1835, it had appeared, by reference or in variation, in the Bridgewater treatises of Thomas Chalmers, Charles Bell, and William Prout.<sup>23</sup> Sedgwick had used it in advocacy of educational reform in *A Discourse on the Studies of the University* (1833).<sup>24</sup> The same argument was, also, the theological “flip side” of the important scientific debates of the early 1830s between the “catastrophists” and the

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Revisited: the Order of Nature and the Nature of Order in Nineteenth-century Britain,” in Ronald L Numbers and James C Livingston, eds. *When Science and Christianity Meet* (Chicago : University of Chicago Press, 2003), pp. 139-60.

<sup>23</sup> Chalmers, Thomas. *On the Power, Nature, and Goodness of God as manifested in the adaptation of external nature to the moral and intellectual constitution of man* (London : Pickering, 1833), pp. 25-26. Charles Bell, *The Hand: its mechanism and vital endowments as evincing design* (London : Pickering, 1833), pp. 215-222. William Prout, *Chemistry, Meteorology, and the Function of Digestion considered with reference to natural theology* (London : Pickering, 1834), pp. 165-67.

<sup>24</sup>Sedgwick, Adam, *A Discourse on the Studies of the University*, eds. Eric Ashby and Mary Anderson, reprint of the first edition (New York : Humanities Press, 1969; 1833), pp. 22-24.

“uniformitarians” in geology. One version of the argument would appear in the mathematician Charles Babbage’s idiosyncratic (and unofficial) *Ninth Bridgewater Treatise*, and another made its way into the very heart of William Whewell’s writings on the history and philosophy of science.<sup>25</sup> It featured prominently in Hugh Miller’s *Testimony of the Rocks*, and its utmost expression would be found as late as 1867 in the Duke of Argyll’s *Reign of Law*.<sup>26</sup> Indeed, the publication of *Vindiciae Geologicae* marked the introduction of one of the more important innovations of nineteenth-century natural theology: the concept of historically “superintended” design.

Buckland suggested in his lecture that natural history had been “superintended” by God in a gradual progress toward ideal and benevolent ends. Stated most succinctly, his argument was that “the subserviency of the present structure of the earth’s surface to final causes ... is evidently the result of many and violent convulsions subsequent to its original formation. ...[T]hese convulsions have operated at successive periods, not blindly and at random, but with a direction to beneficial ends, [displaying] at once the proofs of an overruling Intelligence continuing to superintend, direct, modify, and control the operation of the agents, which he originally ordained.” This was an early and theologically-phrased reference to the scientific doctrine of geological

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<sup>25</sup> Babbage, Charles, *The Ninth Bridgewater Treatise. A fragment*, reprint of the second edition (London : Frank Cass and Co., 1967; 1838), pp. 47-49. Whewell, *History*, op. cit. (Ch I, note 5), iii. pp. 606-22; *Philosophy*, op. cit. (Ch I, note 5), ii, pp. 123-37).

<sup>26</sup> Miller, Hugh, *Testimony of the Rocks* (1857), especially “Lecture Fifth: Geology and its Bearings on the Two Theologies.” Campbell, *Reign of Law*, op. cit. (Ch I, note 3).



catastrophism, for which Buckland and the entire English school of geology have been primarily known to history.<sup>27</sup>

In a footnote to the published lecture, Buckland illustrated his superintendential argument with reference to Britain's "coal measures." These coal fields were not only set at an inclined plane, so that a portion reached the earth's surface, but, also, geological faults had cracked the coal beds and pushed them into overlapping layers, so that more coal lay near the surface and less was deeply embedded. The faults drained water that would otherwise have made mining impossible and, also, interposed layers of stone and earth between the once-continuous coal deposits, so that underground fires in mines would not spread to entire coal fields. Other examples could be cited, but these will indicate the meager utilitarian grounds upon which Buckland believed that it was "impossible ... to attribute such a system to the blind operation of fortuitous causes," and that it would be "unphilosophical to scruple at [final] causes...." He concluded to "a system of wise and benevolent contrivances [that had been made] prospectively subsidiary to the wants and comforts of the [earth's] future inhabitants ... from its first formation through all the subsequent revolutions and convulsions...."<sup>28</sup>

Sixty years ago, in *Genesis and Geology*, Gillispie ridiculed Buckland's proof that God, "the Divine Engineer, had assured manufacturing primacy to his

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<sup>27</sup> Buckland, *Vindiciae*, op. cit. pp. 18-9.

<sup>28</sup> Ibid. pp. 19-21.

British creation" and belittled Buckland's God as "a landscape gardener" rather than a divinity.<sup>29</sup> Today, historians no longer interpret the coal measures analogy as indicative of Buckland's scientific merit or the superintendent divinity as Buckland's final word on the nature of God. Nonetheless, the evidential force of Buckland's superintendental natural theology has not recovered from the ridicule to which it has been subjected; and this is a problem that I would redress. Buckland was not arguing (although he was intimating) that the English earth was intended for coal mining and Englishmen for the benefits of coal; he was claiming only that the accessibility of coal and other minerals had been a utilitarian concern that had directed the geological processes that had formed the surface of the earth. His analogy was to "a thick sheet of ice ... broken into fragments of irregular area and those fragments again united ... [by] intervening portions of more recent ice by which they are held together...."<sup>30</sup> The analogy, then, was to discontinuous but unspecified physical forces that had interposed somewhat messily upon the regular course of natural events, rather than to a clean, mechanical design. The superintendental argument was not an easy inference to make, and Buckland knew it.<sup>31</sup> The geological evidence, however, suggested a succession of disruptive, convulsive actions followed by periods of stability, which in Buckland's view was unlikely to have been the result of

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<sup>29</sup> Gillispie, *Genesis and Geology*, op. cit. (Ch I, note 8), p. 104 and 177.

<sup>30</sup> Buckland, *Vindiciae*, op. cit. 18-19.

<sup>31</sup> Ibid. p. 11.

uniform natural causes or blind fortuity because of the apparent causal discontinuity as well as the relative utility of the final result.

Although historians have emphasized that Buckland and catastrophism went beyond the more "scientific" Cuvier in suggesting "supernatural" causes for the geological revolutions of the past, this was not Buckland's main contention.<sup>32</sup> Rather, his claim was that the catastrophes of the past, which may have had natural although discontinuous causes, had been directed by future considerations and to "beneficial ends." This was a superintendental form of design argument, which is worth noting because it entailed scientific and theological commitments alike.

Scientifically, catastrophism committed geologists to defending the apparent discontinuity of natural history, whether in terms of secondary natural causes or direct supernatural interposition, and it is now allowed to have been as much a contribution to the history of science as was an emphasis upon the uniformity of nature: the uniformity of nature, after all, does not demand an uninterrupted, steady-state system of the earth, whether or not God is posited as the cause of discontinuity and sudden change.<sup>33</sup> Theologically, the superintendental design argument freed natural theology from its unhappy association with eighteenth-century mechanical deism, enabling it to become a

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<sup>32</sup> Coleman, William. *Georges Cuvier, Zoologist: study in the history of evolution theory* (Cambridge, MA. : Harvard University Press, 1964) pp. 126-40.

<sup>33</sup> Rupke, *Great Chain*, op. cit. pp. 193-200. For a more general discussion, see Hooykaas, *Principle of Uniformity*, op. cit.; and "Catastrophism in Geology: Its Scientific Character in Relation to Actualism and Uniformitarianism," in Charles C. Albritten, ed. *Philosophy of Geohistory: 1785 – 1970* (Stroudsburg, PA : Dowden, Hutchinson, and Ross, 1986), pp. 310-56.

distinctly historical and theistic argument and providing a theoretical ground for continuity with scriptural history and narrative. For example, historical superintendence was the common ground of natural theologians and scriptural literalists: the geologists had physically “proved” what was religiously accepted by the literalists, that God had frequently interposed upon history, whether directly or by secondary causes and whether natural or human history was concerned. Such a proof, as Buckland supposed, would make a remarkable contribution of science in support of natural religion, the foundation for revealed religion.

In the body of the lecture, apart from the footnoted coal measures argument, Buckland made a similar claim for superintendential natural theology even more briefly. He noted that the geological evidence clearly pointed to a time when the earth had been uninhabited and uninhabitable. He went on to say that “organic beings must therefore have had a beginning subsequently to this period; and where is that beginning to be found, but in the will and *fiat* of an intelligent and all-wise Creator?” Once again, God was shown to have acted historically: firstly, the earth was created; subsequently, it was prepared for life; and subsequently, again, life was created upon the earth. The earth and its lives, therefore, are not eternal, and all hypotheses of earth history as “an eternal succession of causes ... are still more at variance with the conclusions of Geology, (as a science founded on observation,) than they are with those of

Theology." Buckland wanted his audience and readers to know that atheism and deism had their best refutation in physical science.<sup>34</sup>

However, although Buckland had wanted to emphasize natural theology, it was the coincidental confirmation of scripture that figured most prominently in public discussion. It is important to note, however, that the turn from design argument to scriptural consideration was as much the result of historical accidents as of Buckland's intention. Soon after he had delivered his inaugural lecture, Buckland was forced to notice an article in the *Quarterly Review* that doubted the geological evidence of a universal flood. Inconveniently for Buckland, the article was written against the views of the so-called "Scriptural geologists" who, unlike Buckland, were defenders of the tradition of applying

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<sup>34</sup> Buckland, *Vindiciae*, op. cit. pp. 21-22. Hooykaas has characterized Buckland's theistic design argument as "semi-deism" because it made "the reign of Law ... a metaphysical supposition." Buckland is considered semi-deistic because, in Hooykaas's view, he presumed that regularity was an aspect of nature and reduced divine activity to miraculous interventions. In contrast to semi-deism, Hooykaas understood theism from "the biblical point of view, [which does not] regard divine creative activity as more miraculous than divine sustenance of the regularities of nature" (Hooykaas, *Principle of Uniformity*, op. cit. pp. 192-3, 206). Hooykaas's characterization is representative of a broad band of theological thought that does not care to distinguish between the sustenance of nature and supernatural miracle. This theological point of view is, however, misleading in application to natural theology and, specifically, to Buckland. Significantly, Buckland prefaced his design argument in *Vindiciae Geologicae* by cautioning against the fallacy of referring the laws of nature to anything other than "the continued exertion of the will of the Lawgiver" (*Vindiciae*, op. cit. p. 18). He considered the relation of regularity to discontinuity in natural history to be divinely intended: taken together, regularity and discontinuity were equally intended to constitute the order of nature. This idea is fundamental to any superintendental argument; and, therefore, assigning "order" to nature and "disruption" to God will subvert superintendental thought. Moreover, subordinating a naturalistic design argument to a biblical point of view is a categorical confusion – a philosophical error – that, ironically, resembles the mistake of the scriptural geologists of Buckland's day by equating textual knowledge to physical evidence. The category of "semi-deism," then, though honestly intended, mischaracterizes Buckland according to a supposition he did not hold; subverts his superintendental argument; critiques him by a categorical mistake; and associates him with the deistical arguments he was refuting. Hooykaas's generally valuable study is unreliable here, as will be any analysis of natural theology that negates distinctions between regularity and discontinuity in divine action.

textual evidence to problems in natural history. The article forced Buckland at once to defend the geological evidence for diluvialism “as a matter of science” and to reaffirm an entirely coincidental relation to scripture, which he did in an appendix to the published *Vindiciae Geologicae*.<sup>35</sup> He then pinned himself more closely to this controversy with the subsequent publication of *Reliquiae Diluvianae*, a book which awkwardly forced the debatable evidence for diluvialism upon a fine work of science in the rediscovery of what he called “antediluvial” fauna.<sup>36</sup> Although originally in *Vindiciae* there had been less emphasis upon geology’s coincidence with scripture than upon natural theology, public discussions of the geological evidence for diluvialism and Buckland’s own study of ancient and extinct fauna turned that emphasis around.

Nevertheless, Buckland’s commitment to diluvialism as a confirmation of scripture was never as great as it seemed. As Rupke has shown, it had always existed primarily in deference to the system of classical education at Oxford rather than as a part of his scientific or theological thought. In *Geology and Mineralogy*, he would quietly renounce the evidence for the universal deluge and deny that he had ever identified it with the Genesis flood. This, however, was years after the controversy over “Genesis and geology” had played out in public view.<sup>37</sup>

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<sup>35</sup> Ibid. pp. 35-8.

<sup>36</sup> Buckland, *Reliquiae*, op. cit. Rupke, *Great Chain*, op. cit. pp. 29-63.

<sup>37</sup> Buckland, *Geology and Mineralogy*, op. cit. i, pp. 94-5. Buckland had identified the global deluge with the Genesis flood only in the published appendix to *Vindiciae*, op. cit. pp. 35-38.

By the time Buckland renounced diluvialism over unsupportive evidence, the problem of reconciling Genesis to geology had already publicly broken the proposed coincidence between textual revelation and physical science. Inevitably, this brought a greater reliance upon natural theology (considered as a design argument) as a point of theological interest that might compensate for the loss of scriptural reference. Buckland, however, was not the first Anglican geologist to recognize or deal with the consequences of this break. That distinction had fallen to his colleague in geology at Cambridge, Adam Sedgwick.

### **Adam Sedgwick: Science, Natural Theology, and Anglican Education in a time of Reform**

In contrast to Buckland, Sedgwick had come to his clerical and geological professions more haphazardly. He was born in 1785, third of seven children born to the rector of the little Yorkshire village of Dent. He was elected a fellow of Trinity College, Cambridge, in 1810, in part because economic considerations had discouraged his personal preference to study for the bar. He delayed until 1817 being ordained a deacon (later a priest), knowing that ordination was required of Cambridge fellows within seven years of taking their M.A. The Woodwardian professorship in geology – hardly considered a plum appointment – chanced to fall vacant the following year, and, having promised to learn a science of which he was admittedly ignorant, he was elected to that chair in 1818. Despite the somewhat circumstantial choosing of his professional commitments, however, the sincerity with which Sedgwick accepted and fulfilled

his obligations as cleric and geologist is not in doubt. Over a long and eventful life (d. 1873), he retained his dedication to science, natural theology, and evangelical faith.<sup>38</sup> Although Buckland has always tended to receive first billing among the English geologists of the period, Sedgwick may have been the more impressive of the two, both scientifically and theologically.<sup>39</sup>

Sedgwick's early work in geology supported Buckland's diluvialism. At an 1829 meeting of the Geological Society, however, he was dramatically persuaded by colleagues that Buckland was wrongly interpreting the evidence for a universal deluge. In his 1831 presidential address to the same Society, he "thought it right ... publicly to read my recantation," having been, "to the best of my power, a propagator of what I now regard as a philosophical heresy...."<sup>40</sup> Despite recanting diluvialism, however, on December 17, 1832, in a sermon to the Master, fellows, and students of Trinity, Sedgwick uninhibitedly declared the full importance of all the sciences, including geology, to an Anglican university education. A version of that sermon, laboriously expanded and appended to twice its original length, was published one year later as *A Discourse on the Studies of the University*.<sup>41</sup> Having recognized that a geological coincidence with

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<sup>38</sup> Sedgwick's biography is John Willis Clark and Thomas McKenny Hughes, *The Life and Letters of the Reverend Adam Sedgwick*, two volumes (Cambridge : Cambridge University Press, 1890). Important studies are Klaver, *Religious Sentiment*, op. cit., and Rupke, *Great Chain*, op. cit.

<sup>39</sup> Klaver, *Religious Sentiment*, op. cit. pp. 102–3.

<sup>40</sup> Ibid. pp. 105-6.

<sup>41</sup> Sedgwick, *Discourse*, op. cit.



scripture was untenable, Sedgwick was not reticent to discuss the implications for the connection of science to religion in an Anglican education.

Taken out of context, it would be possible to read Sedgwick's *Discourse* as a conciliatory gesture and a thorough harmonization of science and religion in education. Therefore, it must be emphasized at the outset that Sedgwick was taking sides in a local and national debate. Writing, rewriting, and publishing the *Discourse* coincided with Parliamentary debates that had already led to the electoral franchise reforms of 1832 and would lead to thorough reforms of the Anglican Church in Ireland and England over the next few years. Drastic change to the church and its universities was a real possibility, even including disestablishment. Keble was within seven months of famously warning at Oxford of a national apostasy. Brougham was promoting popular scientific education as a means to the self-improvement of the working classes and had already helped to found the new and secular University of London.<sup>42</sup> Although Sedgwick was not a radical reformer and still considered the topic of his *Discourse* to be the education of Anglican gentlemen, he was known to be a political Whig and an advocate of educational reform. His geological lectures were among the most renowned in the nation upon any scientific topic. These circumstances help to

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<sup>42</sup> Owen Chadwick discusses the Anglican Church during the reform years in *The Victorian Church: Part I, 1829 – 1859*, 2 volumes (London : SCM, 1987) [paperback edition of the 1971 third edition], i, pp. 7-166.

explain the considerable significance and popularity of the *Discourse*, which quickly ran to three printings of 2500 total copies.<sup>43</sup>

Where it concerned geology and natural theology, the *Discourse* was not vastly different from views that had been expressed before. Sedgwick was no more detailed in his design argumentation than Buckland had been, although he went further than Buckland in grounding his religious arguments in natural theology and the moral authority of religion. He no longer made a show of a physical or literal coincidence with scripture. The Genesis flood, of course, was no longer an event of geological significance. The recent creation of the human race was still taken to be geologically evident, but it was not represented any longer as a coincidence with revelation but was observed “[i]ndependently of every written testimony.”<sup>44</sup> The distinction between natural philosophy and textual authority was becoming more evident all the time.

In pertinence to natural theology, more than a decade had passed since Buckland had first sketched his superintendental design argument, and advances in geological science made it possible for Sedgwick to enlarge upon it. He pointed out that recent geological theory made it possible to consider all of terrestrial history as a grand advance in the inhabitability of the earth’s surface, with the recent creation of humans in their intended environment marking full progress. This teleological view fitted the apparently recent creation of humans

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<sup>43</sup> Sedgwick, *Discourse*, op. cit. p. <26>.

<sup>44</sup> *Ibid.* pp. 22-23.

into a superintendential natural theology and enabled the correlation of geology with revelation to become a problem of biblical criticism, not physical science.<sup>45</sup> According to the advanced (if somewhat theoretical) geological science of the English school in the 1830s, very little of the natural history of the earth remained without its theological significance. Science and natural theology suggested that the laws of nature, their final causes, and God's discrete superintendence of natural events were the logically unified determinants of natural history.<sup>46</sup> This was superintendential natural theology taken to its utmost implication, although it was fully conformable with any theological view that did not contradict the "facts" of geological science.

However, where Sedgwick really ran past Buckland was in promoting natural philosophy, moral philosophy and natural theology as the basis for reforming Anglican education. He was not content to attach the physical sciences onto the classical system, as had been Buckland earlier. In order to appreciate the significance of this, two points must be noted: Sedgwick grounded his observations about university studies (with the exception of the physical sciences) in the nature of moral and social human being; and he envisioned moral and social being as governed by general laws of human nature. It was a thoroughly naturalistic view, although this naturalism, founded upon a superintendential understanding of natural history, was not incompatible with

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<sup>45</sup> Ibid. pp. 25–7.

<sup>46</sup> Rupke, *Great Chain*, op. cit. pp. 255–66.

Sedgwick's evangelical religion. While it was in character, then, for Sedgwick to speak explicitly about Christian beliefs – as for example, that “The Christian religion is ... of national importance not merely because it is expedient, but because it is true; and ... of an overwhelming interest to every member of the state” – yet such claims tended to sit comfortably with natural religion – just as in this instance, where the truth of Christianity was soon resolved into the belief that “nothing can, in the end, be expedient for man, except it be subordinate to those laws the author of nature has thought to impress on his moral and physical creation.”<sup>47</sup> Significantly, for the historian of natural theology, Sedgwick's comments upon “expediency” were part of an attack upon the tenets of utilitarian ethics, which were often represented by the ethical philosophy of the foremost utilitarian natural theologian, Paley. Understanding the laws of nature as subordinate to God's purposes rather than to utilitarian principles was important to Sedgwick. Nonetheless, this attempt to reclaim Christian faith from expediency was compatible with naturalism. Sedgwick's natural theology was premised upon a lawful natural order discernible to human reason.

This was not simply an aspect of the *Discourse*. Rather, Sedgwick presented the general lawfulness of the physical and moral worlds, and also the subordination of revelation to those laws, as the first argumentatively significant point of the *Discourse*, stating as his premise that “We are however justified in saying that in the moral as in the physical world, God seems to govern by

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<sup>47</sup> Sedgwick, *Discourse*, op. cit. pp. 70-1.

general laws: and when he declares to us [by a revelation] ... we hear a formal promulgation and higher sanction of [his moral government]."<sup>48</sup> Sedgwick had brought the moral universe, which Buckland had reserved to textual study, under the umbrella of a general naturalism.

Of course, the idea that revelation was a republication of natural law had been floating about Britain for several centuries. Nonetheless, it may have been disturbing, after the reforms of 1832, to have it brought out as the potential basis for an Anglican education. Certainly, its implications were considerable. For example, when Sedgwick doubted the worth of studying "dead languages" as a means to acquiring literary skill and a taste for elegant prose, and advocated, instead, that classical literature and ancient history be used to develop the understanding of "a true system of moral philosophy," he was suggesting that classical studies must become a different and, pointedly, more philosophical discipline from what they were.<sup>49</sup>

More importantly, by basing his moral and social observations upon the general laws that govern morality and society, Sedgwick was advocating a more "scientific" university education. This is not meant to suggest a less religious education – on the contrary, the distinction between science and religion is exactly what Sedgwick was disclaiming. The words "science" and "scientific" did not, in 1833, denote only what are regarded today as the natural or physical

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<sup>48</sup> Ibid. p. 5.

<sup>49</sup> Ibid. pp. 30–35.

sciences. Rather, they meant any body of natural knowledge that could be rendered systematic by a consensus upon its methods and principles; very explicitly, then, Sedgwick was connecting education to natural knowledge and moral science.

History is to our knowledge of man in his social capacity, what physical experiments are to our knowledge of the laws of nature.<sup>50</sup>

We may ... act on a system of Christian ethics founded on the positive declarations of the word of God: but without an inherent moral capacity ... placed in the breast of man, by the same hand that made him, the science of moral philosophy has not, I think, the shadow of any foundation whereon to stand.<sup>51</sup>

Religious knowledge, also, became subject to the strictures of natural knowledge and moral nature.

In natural knowledge, we may mount from phenomena to laws: but in doing this we are held by fetters we cannot break – we cannot alter one link in the chains of natural causes – we can only mark the traces of an unvarying power, external to ourselves, and to which we are ourselves in bondage. If this be our condition in acquiring natural knowledge, what right have we to think, that in gaining religious knowledge, we are permitted to be more free?<sup>52</sup>

Revelation, as has been noted, was regarded as a “higher sanction” of moral laws, and in the end even Christian grace was conformed to this naturalistic pattern, becoming the health and approval of our natural social and moral perceptions:

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<sup>50</sup> Ibid. p. 36.

<sup>51</sup> Ibid. p. 46.

<sup>52</sup> Ibid. p. 104.

Learning, almost beyond that of man – a happy power in tracing out the proofs of natural religion – ... may coexist without a single Christian grace.... [Although] our natural perceptions are cleared and elevated by the light of Christian truth: ... yet we are infirm of purpose, and cannot do what our heart approves and our conscience dictates.<sup>53</sup>

Although Sedgwick postulated a clear distinction between the physical and moral worlds, this marked a distinction within the phenomenal sciences, not a distinction between the scientific and the religious; and this emphasis upon phenomena systematically understood challenged the classical system of Anglican religion in its dependence upon textual authority. In points of physical science, geology had denied even a significant coincidence with the physical facts to the authority of scripture. Although in moral questions, it was certainly not true that texts and revelations had lost all authority, nonetheless Sedgwick made it clear that their authority was based upon their correspondence with and insight into moral phenomena, and he made it clear that revelation was no exception: the authority and truth of revelation was determined by moral philosophers who were not “more free” in gaining religious knowledge than were natural philosophers in gaining physical knowledge.

Geological science and social circumstances alike had changed in the years between *Vindiciae Geologicae* and *A Discourse on the Studies of the University*. The status of science within society had changed, becoming, in the

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<sup>53</sup> Ibid. p. 79.

hands of the Broughamites, a tool for social, political, and educational reform.<sup>54</sup> Whereas previously Sedgwick had supported Buckland's diluvialism and the implied subordination of science to classical texts and authorities, it was now geologically less possible, as well as professionally and socially less liberal, to continue in that way. By 1832, a time of reform, a new Anglicanism was being invested by Sedgwick in physical, moral, and religious phenomena, in the general laws that governed those phenomena, and in the natural and moral philosophers who searched for those general laws in the name of science. In the midst of educational, social and political controversy, Sedgwick was not merely making connections between science and a theological education. He was more and more closely identifying them by putting the study of religious phenomena (subject to general laws) before the study of religious texts, and he was willing to engage in theological controversy to gain his point.

This interpretation is confirmed by Corsi's study of the place of science within the "Anglican debates" at Oxford in the 1830s, and by Rupke's discussion of the relation of the Tractarians to the English school of geology.<sup>55</sup> Although these debates certainly concerned the place of science within Anglican theology and education, they were remarkably free of technical scientific discussion. Rather, their concern was for the relation of religious to natural truth. The

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<sup>54</sup> The relationship of a "Broughamite education" to science, popular education, and the *Bridgewater Treatises* is discussed in Topham, "Science and Popular Education," op. cit. (Ch I, note 14), pp. 405-20.

<sup>55</sup> Corsi, Pietro. *Science and Religion*, op. cit. (Ch I, note 31), pp. 106-40. Rupke, *Great Chain*, op. cit. pp. 267-74.



Oxford Tractarians, for example, were not so much against science as indifferent (or, perhaps, superior) to it, deliberately reserving it to a place outside the university and in commercial society, while advocating a renewed classical education at university and emphasizing the ancient authorities in religion.<sup>56</sup> Other Oxford Anglicans remained convinced of an eventual coincidence between the physical evidence of science and the textual evidence of revelation and a consequent subordination of science to religion.<sup>57</sup> As these concerns reveal, it was not the scientific merit of design arguments that was in dispute among Anglicans – almost everyone assumed an intentional regularity to the natural world. Rather, the debate was over the relation of natural knowledge to religion, theology, and Anglican education, which was being contested at Oxford in terms that were similar to those of Sedgwick’s advocacy of science at Cambridge.

As the 1830s progressed, these contested views were mirrored in writings on natural theology that reached a much wider audience than the universities. Once again, however, what was of primary significance at this time was not whether science supported religion and natural theology, but the place and importance of science and natural theology in politics and religion. The final section of this chapter will show that natural theology in the 1830s was not struggling to keep theology abreast of increasingly intractable science, as has too

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<sup>56</sup> Ibid. Corsi, p. 136. Rupke, p. 271.

<sup>57</sup> Corsi, pp. 209-224.

often been supposed. Rather, the struggle was to assess and affirm the religious significance of science within Anglicanism and within British society.

### **Natural Theology and the Anglican establishment in the 1830s**

So much natural theology was written in the 1830s that it may seem to have been a general interest of the time. This was hardly the case. Recent historical studies have indicated causes for natural theology's popularity that were quite particular and not particularly theological. Jonathan Topham, for example, in his detailed studies of the eight *Bridgewater Treatises*, has noted that "none of the authors primarily designed his treatise to be an exposition of the philosophy of the design argument"<sup>58</sup> and that the works were "chiefly attractive for the qualities of their scientific exposition...."<sup>59</sup> John H. Brooke, also, has provided non-theological causes for the popularity of natural theology, especially social mediations such as dispelling suspicions of heterodoxy in science or brokering religious differences that might arise around scientific views or within scientific societies.<sup>60</sup> Other important studies have followed these same lines of thought in maintaining that natural theology was of less religious than social importance.

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<sup>58</sup> Topham, Jonathan. "Beyond the 'Common Context': The production and reading of the *Bridgewater Treatises*," *Isis* 89, 2 (1998): 233-62 at p. 238.

<sup>59</sup> Topham, "Science and Popular Education," op. cit, p. 403-04. The *Bridgewater Treatises* are considered as design arguments by John M. Robson, "The Fiat and Finger of God," in Richard J. Helmstadter and Bernard Lightman, eds. *Victorian Faith in Crisis* (Stanford, CA : Stanford University Press, 1990), pp. 71-125.

<sup>60</sup> Brooke, "Theology of the Geologists" and "English mix," op. cit. (Ch 1, note 7).

There is no doubt that the popularity of the *Bridgewater Treatises* had more to do with the social history of science than an inherent theological interest. The scientifically vacant but philosophically astute *Natural Theology* of Alexander Crombie, for example, published in 1829, did not share in the popularity of its more scientific cousins.<sup>61</sup> The publisher of the *Bridgewater Treatises* believed that the market for theological books was depressed and did not expect their initial popularity.<sup>62</sup> In retrospect, the publisher had not allowed for the fundamentally scientific interest of what Peter Mark Roget, author of the *Treatise* on physiology, described as “adducing” design through science rather than proving a design argument. For the most part, Roget’s adductions could be read as scientific descriptions of natural phenomena with a theological moral tacked on.<sup>63</sup>

It should not seem odd, however, that, even without a widespread interest in natural theology, the *Bridgewater Treatises* sparked a public theological controversy. Our reading of Buckland and Sedgwick has shown that natural theology was primed as a point of Anglican political and academic debate. Works of natural theology written in response to or at the instigation of the surprisingly popular *Treatises* would betray these political and academic roots

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<sup>61</sup> Crombie, Alexander. *Natural Theology: or, essays on the existence of deity*, ed. James Fieser, reprinted from the 1829 edition with an introduction by the editor (Bristol, England : Thoemmes Press, 2001), pp. v–xv.

<sup>62</sup> Topham, “Beyond the ‘Common Context’,” op. cit. pp. 240-1.

<sup>63</sup> Roget, Peter Mark. *Animal and Vegetable Physiology considered with reference to natural theology*, two volumes (London : Pickering, 1834), i, p. vii.

and exhibit a more properly theological concern. Clearly, the Bridgewater series was being understood by some Anglicans, not as an exposition of science, but as part of a growing political and theological controversy.

Perhaps the most representative non-Bridgewater and non-academic work in affirmation of natural theology in the 1830s would be Brougham's *A Discourse of Natural Theology*, published in 1835.<sup>64</sup> An alliance of science with natural theology had been part of Brougham's intentions for political and educational reform all along, and several works of that nature were published by the Society for the Diffusion of Useful Knowledge in the 1820s – notably by Charles Bell, a future *Bridgewater* author.<sup>65</sup> Brougham and the SDUK soon discovered, however, that natural theology “open[ed] the door to religious controversy among us” (board members could not agree upon what was a safe and suitable point in natural theology as an interpretation of science), causing them to abandon a plan to annotate and republish Paley's book on that topic. Brougham personally went ahead with the project, however, teaming up with Bell to produce a new edition of Paley and, in addition, separately writing and publishing as *A Discourse of Natural Theology* what he had intended to say in an introduction to Paley for the SDUK.<sup>66</sup>

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<sup>64</sup> Brougham, Henry. *A Discourse of Natural Theology, showing the nature of the evidence and the advantages of the study* (Philadelphia : Carey, Lea, and Blanchard, 1835).

<sup>65</sup> Bell, Charles, and Jeffries Wyman. *Animal Mechanics, or, proofs of design in the animal frame*, in *Society for the Diffusion of Useful Knowledge, Library of Useful Knowledge, Natural Philosophy, IV* (London : Baldwin, Craddock, and Joy, 1827-1829; 1838).

<sup>66</sup> Topham, “Science and Popular Education,” op. cit. pp. 413-6. Adrian Desmond, *Politics of Evolution*, op. cit. (Ch I, note 11), pp. 30-1, 203-6. Brougham, *Natural Theology*, op. cit. pp. v–vi.

Although it is interesting to note that natural theology proved controversial even among Broughamite allies, two points are of more immediate interest. First, Brougham began the dedication of his *Natural Theology* by noting that “scientific men were apt to regard the study of Natural Religion as little connected with philosophical pursuits.” The disengagement of men of science from theology and religion was viewed by Brougham as a problem in need of correction, and the entire discourse was structured, not as a design argument, but as a demonstration that natural theology was a science that fit within the matrix of the other natural and moral sciences.<sup>67</sup> In this respect, it was akin to what Sedgwick was claiming for natural theology at Cambridge and was a clear attempt to enlist natural theology on the side of liberal reform.

Secondly, Brougham’s view of the religious significance of natural theology was bound to elicit controversial response from textualists and traditionalists, and, indeed, it is impossible to imagine that Brougham was innocent of controversial intent when he wrote that

it is a vain and ignorant thing to suppose that Natural Theology is not necessary to the support of Revelation. The latter may be untrue, though the former be admitted .... But Revelation cannot be true if Natural Religion is false....<sup>68</sup>

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William Paley, ed. Henry Brougham and Charles Bell, *Paley’s Natural Theology* (London : C. Knight, 1836).

<sup>67</sup> Brougham, *Natural Theology*, op. cit, pp. 10-12.

<sup>68</sup> Ibid. p. 126.

Brougham also wrote that revelations became less credible over time. Such views, written by the leading public advocate of popular and secular scientific education in a time of social reform, cannot have been mistaken as other than controversial by design.

Books were written in reply by Thomas Turton, Regius Professor of Divinity at Cambridge, and by William Irons of Queen's College, Oxford.<sup>69</sup> It is significant, even remarkable, that Turton and Irons tacked against Brougham along different theological lines despite their unity in opposition to liberalism. Although Turton decried any comparison between natural theology and "those glorious manifestations of the Divine Perfections which illuminate the pages of Holy Writ," yet he conceded to Brougham that a proof of natural theology was necessary to the support of revelation.<sup>70</sup> He objected to Brougham by viewing natural theology as a well-rehearsed feature of classical and philosophical thought – a subject in which the Cambridge scholar, Turton, could suppose Brougham to have made innumerable mistakes and omissions – rather than as a novel point of science. Quite differently from Turton, however, Irons rejected any form of design argument as a mode of theology. He argued that "man, by his unassisted natural powers, could never have certainly determined any one truth of theology or religion," and this claim exposed a difference between Irons and

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<sup>69</sup> Turton, Thomas. *Natural Theology considered with reference to Lord Brougham's Discourse on that subject* (Cambridge : Pitt Press, and London : J. W. Parker, 1836). William J. Irons, *On the Whole Doctrine of Final Causes: a dissertation in three parts with an introductory chapter on the character of modern deism* (London : Rivington, 1836).

<sup>70</sup> Turton, *Natural Theology*, op. cit. pp. 228-230.

Turton about what counted as theology. Beyond theological controversy, however, Irons' book, in which Brougham figured prominently, was a denunciation of all "liberality" in religion and politics.<sup>71</sup> Although the liberal Brougham was undeniably a member of the political establishment, his effectiveness in addressing the religious establishment was being fiercely contested.

It is legitimate to suppose that Brougham's motives in writing his *Natural Theology* were not purely religious. He had his political and educational agenda in mind. I do not contend, however, that natural theology had a religious cause, but that it was of religious consequence. We may suppose the replies to Brougham by Turton and Irons to have been equally and oppositely motivated by politics, but they were unquestionably theological arguments. Brougham had argued for natural theology because it pressed science, with its liberal implications for theology and religion, upon the religious and political establishment, which was being defended from science by Turton and Irons. As a politician of national prominence, Brougham ensured that these theological issues, which had already troubled the universities for more than a decade, were seen to be of importance for the nation's political and social life, as well.

Of course, the religious establishment did not respond to these challenges only as did Turton and Irons. As Corsi has shown, the Oxford don, mathematician, philosopher, and theologian Baden Powell spoke more harshly to

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<sup>71</sup> Irons, *Final Causes*, op. cit. p. 11 and 33.

his colleagues about their failure to embrace science within their theology than would any of the practical men of science. Like Brougham, Powell's motives had their political aspects and concerned the implications of science for the political and religious establishment. In a pointed passage, Powell wrote that

Scientific knowledge is rapidly spreading among *all classes* EXCEPT THE HIGHER, and the consequence must be, that that Class *will no longer remain* THE HIGHER. If its members continue to retain their superiority, they must preserve a real *preeminence in knowledge*, and must make advances at least in proportion to the Classes which have *hitherto* been below them.<sup>72</sup>

It was in the interest of maintaining the Anglican hegemony and its real preeminence in knowledge that Powell advocated opening the Anglican universities, and particularly Oxford, to dissenters.<sup>73</sup>

Despite this social and political edge, however, Powell's central concern was for the established religion, and the result was the publication of what may be the most comprehensive and astute consideration of natural theology in the 1830s, entitled *The Connexion of Natural and Divine Truth*.<sup>74</sup> Powell had access to all the earlier discussions of that decade, and he made use of them. He understood that one part of the controversy lay in determining whether it would be a detriment or a contribution to theological argument to prove that invariable laws of nature could provide causes and explanations for all natural phenomena.

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<sup>72</sup> Quoted in Corsi, *Science and Religion*, op. cit. p. 116, from Baden Powell, *The Present State and Future Prospects of Mathematical and Physical Studies* (Oxford, 1832).

<sup>73</sup> Corsi, *Science and Religion*, op. cit. pp. 104-5.

<sup>74</sup> Powell, *Natural and Divine*, op. cit. Powell's essay is discussed in Corsi, *Science and Religion*, op. cit. pp. 178-93.



In Powell's view, all physical phenomena ought to be explained completely by the general laws of matter, although the order of the general laws would require intelligent explanation.<sup>75</sup> This went further than Buckland or Sedgwick, both of whom had argued that natural history was in part the result of a superintending power that exceeded and directed the known and uniform laws of nature.

Powell's view was no more liberal than that of Brougham. Powell, however, was incontrovertibly a part of the religious establishment and was capable of philosophical argument. He was concerned specifically with the theological resistance of Anglicans to science, which he thought was leaving the national religion to stand upon the increasingly inadequate bases of miraculous revelations and traditional authorities. There was more credibility to be gained, he believed, from solidifying the relationship between natural science and better design arguments.<sup>76</sup>

The title chosen by Powell for this religious advocacy of science and natural theology – *The Connexion of Natural and Divine Truth* – was not misleading but revealing: the point of the controversy was not whether science might explain nature without God – no one but radicals thought this possible – but whether a natural theology supported by science was necessary to the credibility of revelation. As Corsi has acknowledged, "Within Anglican circles, the debate on the relationship between scientific and religious values became a

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<sup>75</sup> Corsi, *Science and Religion*, op. cit. pp. 184-7.

<sup>76</sup> Ibid. p. 189-93.

crucial issue, closely related to the question of the role of the universities and of their educational priorities in modern society."<sup>77</sup>

Science and natural theology were enlisted upon only one side of this theological controversy. Although no one was arguing that natural theology dispensed with revelation entirely, there was no doubt that interpreting natural theology as basic to religion and revelation implied a restructuring of the religious and political establishment. Brougham had related natural theology and science to his educational and political reforms, and Powell – beyond providing the Broughamites with their theological justification – was considering the new basis for the Anglican religious establishment to be its comprehension of science. These men, like Buckland and Sedgwick in more limited ways, were not so much connecting or reconciling science to religion as identifying them more and more. Natural theology was their religious premise, and they were criticized upon that point by their opponents: Turton complained that Brougham would fall back upon natural theology as soon as "a direct defense of revelation could no longer be maintained,"<sup>78</sup> while Irons argued against the possibility of having a natural theology to fall back upon.

In such a context, it is not surprising that the advocates of science should find it necessary, not to defend design arguments upon scientific grounds, but to assert the religious significance of natural theology. Brougham's insistence has

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<sup>77</sup> Ibid. p. 123.

<sup>78</sup> Turton, *Natural Theology*, op. cit. pp. 228-230.

already been mentioned. Babbage's *Ninth Bridgewater Treatise* was written in the conviction that "the truths of Natural Religion rest on foundations far stronger than those of any human testimony."<sup>79</sup> Powell stated that "The stability of natural theology rests upon the demonstration of physical truth; and upon the assurance of ... natural theology must ... all notions of a revelation be essentially founded."<sup>80</sup>

The *Bridgewater Treatises*, ever safe and conciliatory,<sup>81</sup> tended to be less concerned to discuss the relation of natural theology to revelation, but they, too, needed to affirm the naturalist's place in theological discussion. Buckland, as an ordained cleric and a geologist, was inevitably concerned to discuss revelation, especially Genesis; and he repeated his trusted affirmation that geology did no damage to revelation that was not vastly offset by important gains in natural religion.<sup>82</sup> Chalmers, the evangelical clergyman, was another *Bridgewater* author drawn to discuss the relation of natural and revealed religion at some length. He claimed that "two positions are perfectly reconcilable – first ... the insufficiency

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<sup>79</sup> Babbage, *Ninth Bridgewater Treatise*, op. cit. p. xv.

<sup>80</sup> Quoted in Corsi, *Science and Religion*, op. cit. p. 186.

<sup>81</sup> For example, in a letter from Lyell to his father, inside jokes referred to Buckland's treatise as a "Bridge-over-the-water" whose moral was "that words may mean anything we like." Katherine Murray Horner Lyell, ed. *Life, Letters, and Journals of Sir Charles Lyell, Bart.*, 2 vols. (London : John Murray, 1881), i, p. 473.

<sup>82</sup> Buckland, *Geology and Mineralogy*, op. cit. i, p. 22.

of natural religion; and secondly, the great actual importance of it." He found natural theology "indispensable, as a preliminary to the gospel."<sup>83</sup>

Significantly, the importance of natural theology was not diminished by leaving its relation to revelation unspecified. Among the *Bridgewater* authors, Whewell, Roget, Prout, and Bell were largely silent about revealed religion, and, in effect, this left the religious importance of natural theology unbounded. Whewell, for example, identified the most original and insightful discoveries and discoverers of science – particularly, astronomical physics and the exalted Newton – with the methods and premises of natural theology, while Prout called God "the Great Chemist of nature" and claimed that the person "who the most studied His works, will be the best qualified – nay, will be alone qualified, to form an adequate opinion of Him."<sup>84</sup> Prout's view, in fact, expressed the audacity of science and natural theology toward traditional religion as succinctly as anything may: he was removing the understanding of God from the hands of people who only lived piously and studied books. Not only politically and socially, but religiously and theologically, natural theology was a wedge by which these men were pushing science more deeply and controversially into the Anglican establishment. This was an advance upon Buckland's attempts to "connect" science and religion at Oxford, but Buckland's views were preliminary to those of

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<sup>83</sup> Chalmers, *On the Power*, op. cit. p. 300.

<sup>84</sup> Whewell, William. *Astronomy and General Physics considered with reference to natural theology* (London : Pickering, 1833), pp. 308-17. Prout, *Chemistry*, op. cit. p. 356.

Sedgwick, and Sedgwick's views were part of the reforming impulse, even if they were not as liberal as those of Brougham and Powell.

Within Anglicanism, the proponents of natural theology and theological superintendence were seeking to bring science into areas of traditional and established authority. They were controversial advocates for science and liberal reform at the universities, in politics, and in theology. If they were successful in furthering their interests, then science would be established as necessary to the support of revelation and views like those expressed by Prout would gain a certain religious authority. On the other hand, the opponents of natural theology, such as Turton and Irons, did not need to refute or even understand science in order to deny the religious significance of design arguments and, at the same time, deny science a voice within established religion, if not politics. These were social and theological disputes about the religious significance of science, and they were unavoidable so long as sincere Anglican clerics like Buckland and Sedgwick considered science a part of their religious and educational vocation that led to clerical advancement; as long as theologians like Powell argued that the privileged and national character of his church required that its theology fully comprehend and endorse science; as long as politicians like Brougham believed that science and natural religion, if not Christian revelation, were essential to the political and social well-being of the nation; and as long as there were social, political, and religious conservatives to resist these liberal views.

Natural theology's prominence at this time, then, was significantly attributable to a religious and theological debate that left scientific argument largely unaffected and brought new knowledge in the natural and moral sciences into social, political, and religious debates of utmost consequence. The celebrated wrong steps – such as an early association with geological diluvialism and a lasting susceptibility to utilitarian explanations of “specially created” organic species – that afflicted natural theology in its efforts to press science into the Anglican establishment were largely confined to the social, religious, and political consequences of its expression, leaving generally directional design arguments remarkably well supported by science and theologically quite controversial in their religious, social and political implications. It was this scientific support for directional design that would be famously challenged by the publication in 1844 of *Vestiges of the Natural History of Creation*.

### CHAPTER III:

#### NATURAL THEOLOGY IN BRITAIN, 1844-1856: SCIENTIFIC RESPONSES TO THE THEOLOGICAL CONTENT OF *VESTIGES OF THE NATURAL HISTORY OF CREATION*



**Robert Chambers**

*Vestiges of the Natural History of Creation* sensationally expounded the “hypothesis of development,” including the transmutation of biological species, and was once known to historians as an amateurish precursor of Darwin’s evolutionary theory.<sup>1</sup> The public reception of *Vestiges*, too, was once understood

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<sup>1</sup> Chamber, *Vestiges*, op. cit. (Ch 1, note 17). Milton Millhauser, *Just Before Darwin: Robert Chambers and the 'Vestiges'* (Middletown, CT : Wesleyan University Press, 1959). Gillispie, *Genesis and Geology*, op. cit. (Ch 1, note 8), pp. 149-83.

to have been a rehearsal of the social and religious antipathies to evolution that Darwin again stirred up but, this time, successfully overcame.<sup>2</sup> Subsequently, however, historians discovered that Darwin worked without any considerable reference to the theories of development represented by *Vestiges*,<sup>3</sup> and, moreover, that the public reception of Darwinism was relatively more accepting and less hostile than had been thought, in part because of partial resolutions to the implications of transmutation worked out in response to *Vestiges*.<sup>4</sup> More recently, it has been argued that *Vestiges* was even more important than Darwin's *Origin* for the adjustments variously made by social groups in Britain, both publicly and in private, to the suggestions of transmutation and progressive social development.<sup>5</sup> Perhaps Darwin did not so much change as settle minds into opinions already explored in response to *Vestiges*. It is better appreciated today, as well, that the scientific writing of *Vestiges*, by the Edinburgh journalist Robert Chambers although published anonymously, was disputed not only for its logical and evidential adequacy, or for its religious acceptability, but, with equal vehemence, as a question of social authorization concerning who would speak

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<sup>2</sup> Millhauser, op. cit., pp. 116-40.

<sup>3</sup> Cannon, "Darwin's Achievement," op. cit. (Ch II, note 1). Ospovat, *Darwin's Theory*, op. cit. (Ch II, note 1). Gillespie, *Charles Darwin*, op. cit. (Ch I, note 10).

<sup>4</sup> Glick, Thomas F., ed. *The Comparative Reception of Darwinism* (Austin, TX : Texas University Press, 1974).

<sup>5</sup> Secord, James A. *Victorian Sensation*, op. cit. (Ch 1, note 17).



publicly on behalf of practitioners of science.<sup>6</sup> The great importance of *Vestiges*, as we understand it today, was not its place in relation to Darwin's theory but its place in the interstices of British scientific and social history. Following suit, nineteenth-century responses to *Vestiges* also are better appreciated today for their social motivation and context, so that, for example, it is Sedgwick's moral and Huxley's professional outrage that are significant, rather than debated points of physical evidence and logical inference.

Scientific responses to *Vestiges* written for a general readership are my concern in Chapter III. I will be attending, however, less to their social motivation and context than to their intellectual form. I hope to be understood, that the formal dispute with *Vestiges* was not primarily over transmutation and special creation but over two different causal explanations for the gradual and historical formation of the natural world, one that premised uniform, the other superintendent causality. My purpose is not to challenge the social histories for their adequacy upon this point, but to revisit aspects of the earlier histories of formal argument that seem to me to have misrepresented the place of superintendental thought in science.

Strictly with respect to the arguments of *Vestiges*, our appreciation of the book today is not greatly different than what it was fifty or sixty years ago. This is not to say that earlier histories may be read just as well as more recent ones.

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<sup>6</sup> Yeo, Richard. "Science and Intellectual Authority in Mid-nineteenth-century Britain: Robert Chambers and *Vestiges of the Natural History of Creation*," in *Defining Science: William Whewell, Natural Knowledge, and Public Debate in Early Victorian Britain* (Cambridge : Cambridge University Press, 1993 [1989]), Chapter XI (pp. 5-31).

The earlier tendency to categorize responses as either clerical or scientific was no less unfortunate than erroneous, and from that mistake followed another – the tendency to opposed “naturalistic” to “supernaturalistic” views of natural history. Forced into such categorizations, clerics were, of course, found to be in support of supernaturalism and religion, opposing naturalism and science. However, the reduction of ideas to fixed, abstracted categories of thought may never do them justice; and it is important to know that the opponents of *Vestiges* were not opposing science and naturalism so much as questioning what science and naturalism were about. These matters extend well beyond the forms of arguments, and, therefore, it is inadvisable to read the earlier histories without some preparation in overcoming their limitations.

The truth remains, however, that the developmental hypothesis categorically excluded “supernatural” causes from the explanations of natural history; that many opponents of development did object to this exclusion; and that, to the extent that “scientific” explanations since *Vestiges* have become only and ever more closely associated with uniformly natural causes, a gap still exists between the developmental hypothesis and its critics that leaves *Vestiges* on the side of science. So long as that gap is not bridged, setting the arguments into their historical context may only provide vantage points from which this difference may be partially overlooked. Traversing that gap would considerably augment the efforts of recent historians to see continuity between science and religion at the time of *Vestiges*. It also would bring greater appreciation for how

design arguments at the time may have looked capable of bringing science and natural theology into contact, leading science onto religion.

It is my contention that superintendental design argument was a true bridge across the divide of nineteenth-century naturalism and supernaturalism, and that admitting superintendental design into the history of scientific thought, if not into the history of the physical sciences, will provide better insight into what science and religion meant to the opponents and proponents of material development. Because God's superintendence of natural history was presumed to follow an ideal plan, there was no insurmountable objection to practicing science upon the premise of superintendental design. Science would prove a way to discover the plan. Objections to superintendence applied only when intervention was presumed to be arbitrary; and the close association of supernatural causality with willful arbitrariness is an historical bias today that may find its correction in due appreciation of superintendental design.

In form, *Vestiges of the Natural History of Creation* was a naturalistic argument for the progressive material "development" of the natural world that was opposed to acts of "special creation."<sup>7</sup> However, the author of *Vestiges* claimed that his thesis was "creation by law" and insisted that he was not contesting the fact of divine creation but only its "mode."<sup>8</sup> For the most part, this should be taken as a quibble, and Chambers seems even to have found it

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<sup>7</sup> Millhauser, op. cit. pp. 86-115.

<sup>8</sup> Chambers, *Vestiges*, op. cit. (Ch I, note 17), pp. 152-8, at p. 156.

conveniently added rather than essential to his views.<sup>9</sup> He argued steadfastly in *Vestiges* for the material development of an originally nebulous cosmos, and his concerns were plainly more philosophical than theological. Nonetheless, Chambers had turned his natural history to theological account, and, in response to his critics, he tended to emphasize “creation by law” rather than the developmental hypothesis.<sup>10</sup> Moreover, the theological responses to *Vestiges* were in many ways more “scientific” than the work they critiqued or, at least, were written by acknowledged men of science, such as Whewell and Sedgwick at Cambridge and, ten years later, Huxley in London. Such concerns make suspect any historiographical view that undervalues the naturalism or scientific stature of the critiques of development.

When nineteenth-century design arguments and natural theology are opposed to science, it presupposes an opposition between what are taken to be “supernatural” explanations that lead to theology, such as special creations and geological catastrophes; and more “naturalistic” theories that lead to Darwin, such as progressive development and geological uniformity.<sup>11</sup> Since the 1960s, however, studies in the history of science have exposed the mistakes in that opposition. Cannon first argued that the basis for Darwin’s achievement had

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<sup>9</sup> Secord, James. “Behind the Veil: Robert Chambers and *Vestiges*,” in James R. Moore, ed. *History, Humanity, and Evolution* (Cambridge : Cambridge University Press, 1989), pp. 165-94.

<sup>10</sup> Chambers, Robert. *Explanations: a sequel to Vestiges of the Natural History of Creation*, published anonymously (New York : Wiley and Putnam, 1846), pp. 16-17. Millhauser, *Just Before Darwin*, op. cit. pp. 144-45.

<sup>11</sup> Gillispie, *Genesis and Geology*, op. cit. (Ch I, note 8), pp. 120, 144-48, 217-20.

been “stolen” from natural theology rather than derived from contemporary science.<sup>12</sup> Subsequently, Ospovat showed that natural theology had been an integral aspect of the development of Darwin’s theory,<sup>13</sup> and Gillespie noted that Darwin’s “creationist” opponents were committed to a scientific paradigm rather than to a defense of theology.<sup>14</sup> More nuanced descriptions of catastrophism and uniformitarianism were offered by Hooykaas and others,<sup>15</sup> and Bowler distinguished Darwinian evolution from what he called developmental and “directional” understandings of natural history that were more amenable to theological interpretation.<sup>16</sup> *Vestiges*, as well, is the subject of a monumental new study by the intellectual and social historian James Secord that carefully dissects all suppositions of a general religious hostility to the book.<sup>17</sup>

These studies have blurred the earlier understanding of an opposition between nineteenth-century science and natural theology. Yet the possibility of integrating these and other studies further into intellectual and social history is frustrated by an inadequate understanding of the design argument standing behind the natural theology written in the 1840s and 1850s, subsequent to

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<sup>12</sup> Cannon, “Darwin’s Achievement,” op. cit.

<sup>13</sup> Ospovat, *Darwin’s Theory*, op. cit.

<sup>14</sup> Gillespie, *Charles Darwin*, op. cit.

<sup>15</sup> Hooykaas, *Principle of Uniformity*, op. cit. (Ch II, note 1), pp. 169-229. Cannon, “The Uniformitarian – Catastrophist Debate,” op. cit. (Ch II, note 1), 38-56. Rupke, *Great Chain*, op. cit. (Ch I, note 10), pp. 193-200; Klaver, *Religious Sentiment*, op. cit. (Ch I, note 30).

<sup>16</sup> Bowler, *Fossils and Progress*, op. cit. (Ch I, note 2), pp. 15-44.

<sup>17</sup> Secord, *Victorian Sensation*, op. cit. (Ch I, note 17).

*Vestiges* and just before the publication of *Origin of Species*.<sup>18</sup> If science in the Darwinian era was somewhat theological, then is it possible that natural theology was scientific in its arguments?

By examining the natural theology written in response to *Vestiges*, a more subtle understanding of the relations between natural theology, design arguments, science, and religion will emerge than has been possible when *Vestiges* is allowed to settle more firmly upon the side of naturalism and science than upon religion and natural theology. The difficulty posed by *Vestiges* for nineteenth-century natural theologians and natural philosophers was not only its advocacy of material development, but that it remained, in addition, a work of natural theology. In *Vestiges*, a natural theology of material development was premised upon finding design in the perfect uniformity and continuity of the natural order, and the foremost intellectual alternative to this view was not a common Christian understanding of special creation but a "superintendental" natural theology that argued, upon scientific and philosophical grounds, for the recognition of directed discontinuity in the order of natural history.

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<sup>18</sup> Today, the most significant studies of natural theology after *Vestiges* may be those of John H. Brooke, "Natural Theology and the Plurality of Worlds: Observations on the Brewster-Whewell Debate," *Annals of Science* 34 (1977): 221-86; "Indications of a Creator: Whewell as apologist and priest," in Menachem Fisch and Simon Schaffer, eds. *William Whewell: a composite portrait* (Oxford : Clarendon Press, 1991), pp. 149-73; and "Between Science and Theology," op. cit. (Ch 1, note 16). These are important and valuable discussions, but they have significant limitations as appreciations of natural theology. The plurality of worlds debate was not a discussion of design but about the possible theological significance of extra-terrestrial life. The discussion of Whewell as apologist is primarily concerned to depreciate the importance of natural theology to Whewell as a priest. Although very insightful in general, Brooke's discussion of teleology from 1820-1876 lacks any reference to superintendental argument, which leads him to consider the natural theologies of Whewell and *Vestiges* as like rather than opposed arguments (p. 60-61). It is important at this time, I believe, to reconsider early- and mid-Victorian natural theology as potentially scientific rather than primarily religious argument.

It is by attending to the distinction of superintendental from developmental natural theology that further understanding must begin. However, a closer examination of these theologies does not result only in better distinctions. Many of the theological responses to *Vestiges* indicate complicated concerns that generally tended to separate science from religion, not by opposing science to natural theology, as has been commonly understood, but by associating natural theology more closely with science while divesting it of religious significance. That is the thesis of this chapter. The thesis will be sustained by attendance to critiques of *Vestiges* written over a period of a dozen years by Whewell and Powell, Anglican philosophers of science and natural theologians; Sedgwick and Hugh Miller, geologists and natural theologians; and Huxley, a younger and aspiring “man of science” with a technically adequate grasp of the bases for natural theology in the most current natural sciences of his day.

### **Geology, superintendence, and Anglican science – the “catastrophism”/“uniformitarianism” debate in advance of *Vestiges***

A tenth edition of *Vestiges* – the last before Darwin’s *Origin of Species* – was published in 1853, and the young Tom Huxley, not yet thirty years old or secure enough as a scientific professional to marry Henrietta Heathorn, his Australian fiancé, was asked to write a review article for the *British and Foreign Medico-Chirurgical Review*. The journal was relatively obscure, but *Vestiges* still commanded enough public attention for Huxley to value the acclaim of being its

critic. He set to it with a will, unabashedly hostile, beginning by quoting Macbeth after seeing Banquo's ghost: "Time was, that when the brains were out, the man would die." Pertinent to *Vestiges*, Huxley was amazed that the "utter ignorance of the public mind as to the methods of science" had prevented "a mass of pretentious nonsense" from being exposed as "charlatanerie."<sup>19</sup>

Later in life, Huxley regretted his ferocity in this review.<sup>20</sup> He might as well have regretted his misrepresentations. His most savage criticisms were founded upon a blatant and undoubtedly deliberate misreading of the "fundamental proposition" of *Vestiges*, which was, in the words of the tenth edition, "'creation in the manner of law,' that is, the Creator working in a natural course, or by natural means." In his review, Huxley reduced this proposition, "in all its naked crudeness, [to] the belief *that a law is an entity* – a Logos intermediate between the Creator and his works" that was capable of causing or producing natural effects.<sup>21</sup> A more philosophical view, perhaps, would have been that the laws of science were not actual causes but only abstractions or generalizations induced from observed phenomena. However, although *Vestiges* did admit of this philosophical doubt, there was undoubtedly more to its fundamental proposition.

Huxley supported his claim with a few citations from the book. The

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<sup>19</sup> Huxley, Thomas Henry. "Vestiges of the Natural History of Creation, Tenth Edition, London, 1853," in *Scientific Memoirs Supplementary Volume*, ed. Michael Foster and Ray Lankester (London : MacMillan, 1903; 1854), pp. 1-19.

<sup>20</sup> Huxley, Thomas Henry. "On the Reception of *The Origin of Species*," in *Life and Letters of Charles Darwin*, two volumes (London : John Murray, 1887), i, p. 542.

<sup>21</sup> Huxley, "Vestiges," op. cit. p. 3.



longest of these revealed not only the error of *Vestiges* but Huxley's misreading of the basic point. In a crucial passage cited at more length by Huxley, *Vestiges* had claimed that "The Eternal Sovereign arranges a solar or an astral system, by dispositions imparted primordially to matter; he causes, by the same majestic means, vast oceans to form and continents to rise and fall ... so as to fit the earth for a residence of organic beings. But when [life is created, we hear from some learned philosophers of] 'creative fiats,' 'interferences,' 'interpositions of the creative energy'.... Let the contrast between the two propositions be well marked. According to the first, all is done by the continuous energy of the divine will...: according to the second, there is a procedure strictly resembling that of a human being in the management of his affairs."<sup>22</sup>

Huxley mocked this view by denying that there was a genuine distinction between a continuous energy of the divine will, on one hand, and interpositions of creative energy, on the other. Also, the longer passage supported Huxley's contention that *Vestiges* mistook the scientific laws of nature for an efficient Logos-entity. There is no doubt, however, that the passage cited from *Vestiges* had most urgently contrasted the creation of astral and geological systems "by dispositions imparted primordially to matter" to the creation of biological systems by "a procedure strictly resembling that of a human being in the management of his affairs." Huxley made no reference to this distinction in his criticisms, and, by that omission, somewhat surprisingly neglected to mention the point of the

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<sup>22</sup> Ibid. p. 4.

controversy over *Vestiges*, which was, in fact, whether natural history was the product of unvarying material laws or had included a theological superintendence that strictly resembled the management of affairs by a human being.

Superintendential natural theology became an issue in *Vestiges* because of its robust scientific pedigree in nineteenth-century Britain. As we saw in Chapter Two, the idea that God had superintended geological and biological history “with a direction to beneficial ends” had been first broached by Buckland, the Anglican clergyman and geological catastrophist, in his 1819 inaugural lecture as geology reader at Oxford. In the lecture as published, Buckland had used the British “coal measures” to adduce his argument, urging that these coal fields had been anciently broken into fragments and reset into vertical layers that reached the earth’s surface, exhibiting “a system of wise and benevolent contrivances ... for the wants and comforts of the [earth’s] future inhabitants....” Buckland noted that this superintendential argument was an improvement upon the natural theology of Paley, Newton, and others, because their mechanical proofs had left room to “doubt the continued superintendance [sic] of that intelligence” which had originally created the world. Following the publication of Buckland’s lecture, many natural theologians and men of science – the most important of whom will be discussed in this chapter – would follow his lead in commending a superintendential view of natural history. As the first truly historical natural science, geology had contributed the first truly superintendential design argument, founded upon the remarkable claim that

causal discontinuity in geology exhibited intention and design differently than did Paley's argument from the utility of natural forms or Newton's argument from mechanical regularity.<sup>23</sup>

The formation of the coal measures was, of course, an instance of Buckland's convulsive, cataclysmic, or "catastrophic" geological theory that has more commonly been associated by historians with earthquakes and floods. In fact, however, that common association is a classic instance of the confusion that historians have long suffered between the scientific, theological, religious and cultural aspects of natural theology. Despite a religious and cultural emphasis upon "supernatural" events such as global floods, Buckland's primary claim was that the natural forces that had formed the earth's surface had been discontinuous, and that they had been directed or superintended by God to benefit increasingly advanced and, ultimately, human life. The argument depended upon fairly definite conceptions of natural forces, natural history, and natural forms, not upon an allowance for the arbitrary exertion of supernatural powers.<sup>24</sup> The exercise of God's will over the forces of nature was limited to instances of superintendential design, somewhat similarly, it may be suggested, to the way machines at any construction site have been superintended by intelligent workers who managed them, and who, in turn, were informed by construction plans in determining an appropriate act of superintendence.

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<sup>23</sup> Buckland, *Vindiciae*, op. cit. (Ch I, note 29), pp. 14-19.

<sup>24</sup> Rupke, *Great Chain*, op. cit. pp. 255-66.

Superintendence was able to incorporate supernatural causation into an historical and evidential design argument because design, not miracle, was the key to the argument.<sup>25</sup>

In the history of British science, Buckland's cataclysms were famously opposed by the uniformitarian geological science of Charles Lyell.<sup>26</sup> Lyell contended that geologists must form their theories by strict analogy to natural forces that are seen to be presently (or "actually") at work in forming the earth's surface. Unwilling to suppose that past natural forces may have differed in kind or intensity from those that were now actual and observable, Lyell proposed perfectly uniform forces at work over practically infinite time as a more plausible explanation of geological formation. The theoretical result was a geological system perpetually maintained in a state not identical but always closely analogous to that of Lyell's own day, a view that harkened back to the eighteenth-century geology of James Hutton, who had found in the unvarying system of the earth "no vestige of a beginning, - no prospect of an end."<sup>27</sup> The expectation of a world that had been originally in a radically different and uninhabitable state, that had changed slowly and, upon occasion, convulsively

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<sup>25</sup> Superintendence is the theological significance of the "directional" science noted in Bowler, *Fossils and Progress*, op. cit.

<sup>26</sup> Lyell, Charles. *Principles of Geology*, op. cit. (Ch II, note 2), i. Gillispie, *Genesis and Geology*, op. cit. pp. 121-48.

<sup>27</sup> Hutton, James. "The Theory of the Earth, or an investigation of the laws observable in the composition, dissolution, and restoration of the land upon the globe," *Transactions of the Royal Society of Edinburgh*, I (1788): 209-304, at 304; later published as *The Theory of the Earth with proofs and illustrations*, two volumes (1795), i, at p. 200.

into a hospitable earth, and that had hosted at least one subsequent, original appearance of life, was Buckland's view, not Lyell's, despite the influence of Lyell's theories upon Darwin and their consequent association with more modern science.

The designation of Buckland's theory as geological "catastrophism," however, was not his own but that of Whewell, the Anglican historian and philosopher of science, and Master of Trinity, Cambridge, who chronicled and philosophized over the geological debates of the 1830s.<sup>28</sup> Although Buckland has been considered the archetypal catastrophist, it is a designation that would be more aptly applied to Whewell. In fact, the effect of the debate with the uniformitarians upon Buckland (or, better said, of the conversations he had with his friend Lyell) was that he quietly dropped the claim of geological superintendence from his natural theology.<sup>29</sup> Whewell, however, elaborated catastrophist geology into a demonstrative argument for the theological superintendence of natural history.

Whewell's philosophy of science has generated scholarly debate largely over its projected antipathy or sympathy to Darwin, so that Jonathan Hodge has found it necessary to remind historians that Whewell cannot be adequately considered a precursor of Darwin. Hodge and Richard Yeo have called attention

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<sup>28</sup> Whewell, *History*, op. cit. (Ch I, note 5), iii [hereafter referenced as *History*], pp. 506-20; *Philosophy*, op. cit. (Ch I, note 5), i [hereafter referenced as *Philosophy*], pp. 665-80.

<sup>29</sup> Buckland, *Geology and Mineralogy*, op. cit. (Ch II, note 8), i, pp. 524-47. I do not know that any interpreter of Buckland has yet noticed that the natural theology of *Vindiciae* differs from that of *Geology and Mineralogy* by the absence of specifically superintendential claims from the latter.

to Whewell's overriding interest in adjudicating the boundaries of the various sciences with respect, ultimately, to theology and, in particular, Anglicanism.<sup>30</sup> Whewell was concerned, in other words, with providing a conceptual basis for the incorporation of science into Cambridge and other Anglican institutions.

Contrasting uniformitarianism with catastrophism was of central importance to Whewell's philosophical project. It was primarily by a consideration of geology that Whewell established three of his most characteristic ideas: a unique category for the physical sciences of historical causation ("palætiology"), a union of the physical and moral sciences, and a superintendential natural theology. These ideas, in turn, would prove fundamental to the relation of science to theology and religion. It is not too much to say, therefore, that the debate over geological catastrophes was basic to Whewell's conception of a suitably Anglican philosophy of science. His philosophy is easily related, in turn, to the wider work of determining a place for science within the Anglican educational, political, and religious establishment, which was the motive force behind much of British natural theology at the time. Although historians have followed Buckland's natural theology insofar as it tended to support debates over miraculous catastrophes and the relation of geology to Genesis, the implications of what Buckland was doing become fully visible by following them to Whewell.

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<sup>30</sup> Hodge, M. J. S. "The History of the Earth, Life, and Man: Whewell's philosophy of palætiological science," in Menachem Fisch and Simon Schaffer, eds. *William Whewell*, op. cit. (Ch II, note 5), pp. 255-88. Richard Yeo, "William Whewell's Philosophy of Knowledge and its Reception," in Fisch and Schaffer, pp. 175-99; and "William Whewell, Natural Theology, and the Philosophy of Science," in *Annals of Science* 39 (1979): 493-516.

After the publication of *Vestiges*, the first fully engaged response from the Anglican establishment was Whewell's *Indications of the Creator*, published in 1845.<sup>31</sup> *Indications* contained selections from Whewell's previously published *History and Philosophy* of science as well as from his earlier Bridgewater treatise on astronomy and general physics,<sup>32</sup> and it was prefaced by a consideration of *Vestiges* that did not refer to the latter by name. The casual manner and brevity of the original material could be interpreted as Whewell's failure to appreciate or, perhaps, unwillingness to acknowledge the significance of *Vestiges*.<sup>33</sup> Nothing could be further from the truth. Whewell's thin volume, prepared and priced to appeal to the well-to-do, drew upon his familiarity with the kind of theories advocated by *Vestiges* and, often, of the particulars. In Whewell's view *Vestiges* was nothing new; and, to the educated Anglicans who found *Vestiges* novel and shocking, his message was clear: Anglican science is your first defense against the disturbing implications of development. Why Whewell believed that science repudiated *Vestiges* will be the next topic for discussion, along with why others were not so sure.

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<sup>31</sup> Whewell, *Indications*, op. cit. (Ch I, note 6).

<sup>32</sup> Whewell, *Astronomy and General Physics*, op. cit. (Ch II, note 84); *History, Philosophy*.

<sup>33</sup> E.g. Millhauser, *Just Before Darwin*, op. cit. p. 120. A different perspective is provided by Secord in *Victorian Sensation*, op. cit. pp. 227-9.

## **Anglican philosophical debates in response to *Vestiges*: William Whewell and Baden Powell**

Whewell distinguished historical from mechanical causation within the physical sciences partly by distinguishing the causes from the effects of any physical system.<sup>34</sup> Today, Whewell's distinctions are surprising because of our familiarity with regular mechanical explanations for the historical development of the physical world. In Whewell's mind, however, physical mechanics – the exemplar of which would have been the Newtonian solar system – were more closely associated with systems whose effects did not vary or “develop” over time; and these mechanics, therefore, could not be used to explain the origin of a system nor subscribe to gradual development. Of course, various scientific philosophies of mechanical and material development had been proposed as explanations for the formation of the physical world ever since Descartes, but such philosophical speculations were antithetical to the tradition of British inductive science that was Whewell's model and interest. From Whewell's point of view, the novelty of geology in British science was its insistence that sound inductions from physical evidence pointed towards the historical origin of many things in nature; most notably, of biological species and a cooling earth. This allowed for the repeated and perhaps wholesale creation and extinction of species, along with the possibility of a hot, nebular origin of the earth and the eventual exhaustion of terrestrial heat.<sup>35</sup>

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<sup>34</sup> Whewell, *Indications*, pp. 96-103; *Philosophy*, pp. 637-42, 654-8.

<sup>35</sup> *Indications*, pp. 96-122; *Philosophy*, pp. 637-708.



In Whewell's thought, however, such evidence did not lead inevitably to the acceptance of mechanical systems of material development, but, rather, to the open question of historical causation. What were the causes of nature's terrestrial history as it appeared in the geological record? Whewell recognized that principles of material development were a potential explanation, but, in his judgment, it was just as plausible that natural history's causes were theological, not material. His philosophy of induction was built around the presumption that theological explanations of nature, although not binding upon physical science or constitutive of it, were nonetheless valid in their own way when found to be in consonance with natural knowledge. Although any science, when it had reached a demonstrable conclusion upon valid principles of induction, was allowed to correct theology where their views openly conflicted, no science began with premises that precluded the validity of theological contributions to our understanding of natural history.<sup>36</sup>

Central to these philosophical contentions was what Whewell termed "palætiology," a class of sciences, such as geology, philology, and archeology, "directed ... to ascertain[ing what a] series of events has been... [and] also how it has been brought about."<sup>37</sup> In their physical aspects, the palætiological sciences would appeal to mechanical and material principles, but Whewell thought it would prove impossible to reduce the phenomena entirely to their

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<sup>36</sup> *Indications*, pp. 62-71; *Philosophy*, p. 658; *History*, pp. 483-88. Hodge, "History of the Earth," op. cit. Yeo, "Whewell's Philosophy," op. cit.

<sup>37</sup> *Indications*, p. 96; *Philosophy*, p. 637.

mechanical and material explanations. For example, in archeology it was impossible to keep physical effects entirely separate from intellectual and moral agency: humans have intentionally altered the physical course of nature, just as nature has unintentionally altered the physical characteristics of humans and their products, exerting a physical influence upon moral affairs. Analogously, Whewell thought that it was possible for God to have played an intentional part in natural history and for there to be laws of physical nature that were intended by God to a moral effect. It did not seem likely to Whewell that the origination, laws, mechanics, and history of spoken language, for example, would be explainable without reference to moral as well as physical categories.<sup>38</sup>

Although the analogy to moral laws and human intentions obviously prepared a theological design argument, Whewell did not pursue it directly. He argued, divertingly, that the causes of all natural events are capable of being described by the general laws of nature, without reference to God's moral intentions or miraculous interventions. Whewell insisted that natural science was always concerned with inducing the general laws of nature from their empirical evidence, and that all natural phenomena were referable to one or another of the natural sciences. In insisting upon this, Whewell was not wavering upon the reality of theological causes. Rather, he argued that the evidence of theological

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<sup>38</sup> *Indications*, pp. 96-103. *Philosophy*, pp. 637-42.

agency in nature was to be found at the level of the general laws; in their logical interrelation and historical operation.<sup>39</sup>

Through his defense of catastrophism, Whewell argued that it may be necessary for science to discover laws of nature in description of physical forces, effective in the past, that were very different in kind or intensity from any forces that are presently actual. The order of the laws of nature, in other words, may not have been historically uniform. There may have been different laws for different occasions, and Whewell believed that geological evidence, especially, may support such a conclusion. This was, after all, the exact point of debate between catastrophists and uniformitarians, and although Whewell would not prejudge the outcome of that debate, he did worry that an insistence upon causal uniformity as an explanatory model risked forcing facts to fit theory.<sup>40</sup> As an example, he hit upon problems in explaining the historical origins of species.

At a time when paleontology was not a science distinct from geology, difficulties in explaining the geological record of past life could be construed as an objection to a geological theory in general. The problem for Lyell and the uniformitarians was that there was no evidence for the present creation of new species, and therefore there was no uniformitarian analogy to a geological record in which a whole earth's worth of new species seemed to have been created on several distinct occasions in the past. On the other hand, the episodic extinction

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<sup>39</sup> *Indications*, pp. 94-5; *Philosophy*, pp. 634-6; *Astronomy*, pp. 300-02, 356-65.

<sup>40</sup> *Indications*, pp. 106-9; *Philosophy*, pp. 665-79; *History*, pp. 513-8.

and creation of species fit well with the twinned ideas of geological catastrophes and a changing terrestrial habitat brought on by a cooling earth. The paleontological record represented a difficult challenge for uniformitarian theory, and although Whewell thought it rash and unscientific to speculate upon precisely what had been the cause of special creation, he had no difficulty accepting the historical record of special creations as a fact within the palætiological sciences, whether or not their cause were specifiable. In fact, Whewell believed that, in this case, it would prove to be beyond the capability of the mechanical or physical sciences to provide a cause because the ultimate explanation would be the original creation or intentional implementation of a new order of nature – an act, in other words, of theological superintendence – that was evident in the geological record and that marked the introduction of new physiological and biological mechanisms into natural history. These new mechanisms, in turn, would determine the subject matter of their associated mechanical sciences.<sup>41</sup>

Whewell was not calling upon natural philosophers to admit theological explanations into their work, and he placed no restrictions upon what the philosophers might attempt to demonstrate. He believed, however, that there were limits to what the laws of nature and the properties of matter could be expected to explain. He did not think it likely that mechanical principles would be capable of explaining the entirety of geological formation, that geology and

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<sup>41</sup> *Indications*, pp. 62-71; *History*, pp. 483-88.

mineralogy would be able to explain life's origins, forms, and adaptations, or that biology and physiology would be able to explain moral consciousness and reason. Although these and all natural phenomena were subject to the laws of nature appropriate to them, it did not follow, Whewell argued, that geology was implicit within physics, or biology within geology, or reason and morality within biology. Thus, the origins of life, consciousness, reason, etc., were like the episodic geological catastrophes of the past in their indication, not of miracles falling outside the bounds of nature, but of the historical and discontinuous origins of new orders of nature that could be creative or destructive in their power.<sup>42</sup> It followed that each of the separate branches of science ought to be established upon the explanatory and causal principles as well as what Whewell called the "fundamental ideas" most appropriate to them. There was no absolute unity of physical causation and explanation to the sciences; each science rested upon its own physical and intellectual foundations.<sup>43</sup>

Whewell considered it to be the goal of the natural sciences to derive the most general laws of nature possible by the practice of sound philosophical induction from the available empirical evidence, without theological restriction. Nonetheless, in his view, natural history would be shown eventually to accord with the historical superintendence of the general laws of nature rather than with the principles of uniformitarianism or material development. God had called into

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<sup>42</sup> *Indications*, pp. 62-71; *History*, pp. 483-88; *Philosophy*, pp. 654-8; *Astronomy*, p. 366-81.

<sup>43</sup> Yeo, "Whewell's Philosophy," *op. cit.* pp. 498-505.

being new orders of nature at the time appointed for them – material, biological, conscious, and moral orders, intended for each other and building upon one another but not implicit within one another. Although the various natural sciences worked toward understanding the natural order without reference to this ultimately theological explanation, they would inevitably point to the theology of the natural world when they discovered the restricted relation of nature’s most general laws to each other and to the consequent direction of natural history.<sup>44</sup>

In perfect distinction from having been caught unaware by *Vestiges*, Whewell had prepared a philosophy to circumvent it. The association of science with his particular philosophy of induction predetermined that the speculative, hypothetical approach of *Vestiges* was deemed unscientific. Having premised the various sciences upon the understanding that each branch of natural philosophy should be left to discover the general laws and fundamental ideas most appropriate to its particular order of nature, the universally applicable principle of development espoused by *Vestiges* was inevitably considered unscientific, inexpert, and presumptive. Moreover, because he criticized *Vestiges* at the philosophical and methodological level, Whewell had no positive need to disprove the developmental hypothesis. Rather, he criticized the hypothesis as the result of poor method, a criticism that connoted a moral judgment against its author and suggested a lack of character and education. Whewell’s *History* and

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<sup>44</sup> *Indications*, pp. 159-61. *Philosophy*, 706-8; *Astronomy*, pp. 378-81.

*Philosophy* of science contained an ambush waiting for *Vestiges*, an ambush that was quickly sprung as *Indications of the Creator*.<sup>45</sup>

It should be clear, however, that Whewell's *Indications* epitomized the "learned" philosophy that was ridiculed in later editions of *Vestiges* as wavering between a commitment, on one hand, to primordial dispositions of matter and a commitment, on the other hand, to a supernatural and intentional agency strictly resembling that of a human being in the management of daily affairs. Nor did the author of *Vestiges* wait for subsequent editions to attack Whewell on these and other grounds, but initiated his response with the publication in 1846 of *Explanations: a sequel to "Vestiges of the Natural History of Creation."* Perceptively, *Explanations* targeted the palætiological sciences as both the crucial and weak link in Whewell's philosophy and raised the difficult question whether Whewell, in the interests of sheltering a religious and political establishment from ideas that were found threatening, was reserving science to the domain of highly specialized and formally educated professionals.<sup>46</sup>

### **Baden Powell**

Advocates for *Vestiges* and *Explanations* within the Anglican establishment were not easy to find, but a prominent one was Baden Powell, whom we have already met in Chapter Two, the Savilian Professor of Geometry at Oxford and,

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<sup>45</sup> Methodological criticisms were implicit in the preface to the first edition of *Indications* (pp. xiv, xvi-xvii, xix) and explicit in the second edition (London : J. W. Parker, 1846), pp. 7-30.

<sup>46</sup> Chambers, *Explanations*, op. cit. pp. 87-95.

like Whewell, a philosopher of science and a natural theologian. Powell's extended discussion of science, philosophy, and natural theology, *The Unity of Worlds and of Nature*, contained a running commentary upon Whewell's conception of scientific induction and its relation to natural theology and design argument.<sup>47</sup> Despite their mutual commitments to established Anglicanism, science, and natural theology, Powell and Whewell opposed one another upon basic points. For example, Whewell's inductive philosophy placed its emphases upon protecting scientific inquiry from a presumption of the uniformity of nature, assuring that each branch of natural philosophy worked upon the distinct explanatory principles that were indispensable to its success. Powell, however, found that the "Principle of uniformity throughout nature [is] the essence of all induction" and that the inductive sciences all strove toward unity through the discovery of ever more general laws of nature as an expression and confirmation of nature's presumably absolute uniformity.<sup>48</sup>

Although Powell did not advocate the developmental hypothesis of *Vestiges* conclusively, he did accept it as suitably scientific theory which, if demonstrated, would conform to his understanding of science, natural uniformity, and natural theology. In his view, it was not only that there was nothing unphilosophical about postulating inherent properties of matter that

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<sup>47</sup> Powell, Baden. *The Unity of Worlds and of Nature: or, three essays on the spirit of the inductive philosophy; the plurality of worlds; and the philosophy of creation*, second edition (London : Longman, Brown, et. al., 1856). Corsi, *Science and Religion*, op. cit. (Ch I, note 31) discusses *Unity of Worlds* on pp. 279-83.

<sup>48</sup> Powell, *Unity of Worlds*, op. cit. at p. 102; also see pp. 3-41, 515-29.



might generate life under predetermined physical conditions, as *Vestiges* had suggested. Powell also held that the developmental scheme would be more consistent with the principles of science than would the presumption of causal discontinuity. Criticizing Whewell implicitly, Powell wrote that “the *sciences of organization and life* ... are sometimes supposed [exceptional] ... to the general *unity of the sciences* ... and not only that we *cannot* explain [their ultimate causes] on any merely physical principles, but that we *ought not* to attempt to do so: ... [however,] the inductive philosopher would simply seek ... [the] determinate order which undoubtedly in reality pervades them...”<sup>49</sup>

Having premised his philosophy of science upon the uniformity of physical causes and the unity of the sciences, Powell could not then embrace a superintendental natural theology. He distinguished design arguments that were premised upon intention from those that were premised upon order, arguing that, although nature displayed orderliness everywhere, any supposed purpose to this order was much less evident.<sup>50</sup> The clearest evidence of intentional or purposeful design in nature was restricted to biological morphology, and even there, many features of organic form were without any evident purpose. Indeed, at the time Powell was writing in the 1850s, advanced morphological science was drawing ideal or strictly formal relationships between biological individuals, species, and genera, rather than explaining the apparently intentional adaptation

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<sup>49</sup> Ibid. pp. 65-67.

<sup>50</sup> Ibid. pp. 140-79, especially at pp. 164-8.

of special biological forms to their conditions of existence. Morphological science, in other words, was using concepts of orderly form, not intentional adaptation. Powell argued that order, and not only intention, was a characteristic of intelligent design.

Having premised his natural theology upon order rather than intention, it was obvious to Powell that positing discontinuity in the physical causes of natural history would be an impediment to his argument. This was the fundamental point of Powell's disagreement, not only with Whewell, but with quite nearly all of what passed for natural theology in Britain at the time. The superintendential argument required causal discontinuity in natural history as a feature that afforded an intentional and precluded an inherently physical and uniform explanation for the historical development of the earth. It must be remembered, however, that what was at stake in superintendential argument was not the arbitrary interruption of the natural order by God. Rather, at stake was the intentional direction of natural forces toward ends that were nature's intended order but to which the physical forces of nature were inadequate without supervision.

It is sometimes supposed that the distinction of order from intention brings clarity to different kinds of design arguments.<sup>51</sup> However, in considering the case of Powell and superintendential natural theology, at least, this was only partly the case. Intentions are, of course, an ideal form of order; and ordered

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<sup>51</sup> E.g. McPherson, *The Argument from Design*, op. cit. (Ch I, note 4), pp. 6-9. Hurlbutt, *Hume, Newton*, op. cit. (Ch I, note 4), pp. 6-10.

physical states may be the result of intention, even if there was no intention further than the achievement of order. As we have seen, the general and comprehensive orderliness of nature were affirmed by Whewell and was an essential part of his superintendential design argument. Powell's conception of orderliness, on the other hand, may be characterized as a denial of superintendence: it denied the plausibility of appeals to supernatural contraventions of nature's presumably absolute physical uniformity.

Because science was soon to reject superintendential explanations, it is easy for historians to give exaggerated weight to Powell's ideas. The denial of superintendence in natural history, however, is not as philosophically straightforward as it may seem. Although it must be allowed in philosophical discussion that, as one commentator has said, "It is not easy to see how some laws might be suspended in an arbitrary way and the universe remain intelligible,"<sup>52</sup> the basic superintendential claim is that intervention is not arbitrary but conforms to an ideal plan or preconception. It may be noted, in addition, that chaos and unintelligibility cannot be superintended. A preexistent and a subsequently reliable order are always premised by a superintendential argument whether or not there is reference to purpose or utility.

The fundamental difference between Whewell and Powell, therefore, was not perfectly clarified by the distinction of intention from order. Whewell premised his understanding of the natural order upon the idea of theological

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<sup>52</sup> McPherson, *Design*, op. cit. p. 26.

superintendence. Consequently, he denied that the discontinuities he postulated in natural history were an impediment to an understanding of the order of nature. Directed discontinuity was, rather, characteristic of the kind of order always exhibited by nature – even though discontinuity was, at the same time, “miraculous” by its exception to the inherent order of physical causes.<sup>53</sup> Powell, however, characterized orderliness as a continuously operative physical process without need of superintendence. Consequently, Powell thought that the kind of discontinuity postulated by Whewell was antagonistic to the order of nature and an impediment to the advancement of science. Although Powell’s view may seem more scientific today, this was not clarity in his thought but confusion when considered as an argument in nineteenth-century natural theology.

The idea of uniform physical processes in continuous operation is (perhaps) synonymous with science today. It was not yet so in the 1850s, however, and had nature clearly exhibited the kind of order envisioned by Whewell, the physical sciences would have had to comply. No one of significance in the 1840s and 1850s was arguing that physical science must comply with theological dictum and cede the reality of miracles, and few were arguing that nature in all its aspects served obvious purposes. Rather, there was disagreement over whether the order exhibited by nature was characteristic of theological superintendence or of uniform physical causality. Nor was it the case that Powell, in distinguishing order from intention, had freed his natural theology

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<sup>53</sup> Whewell, *Indications*, op. cit. p. 62.

from all understanding of purpose. He had not. Powell still believed that the natural order was beneficent and ended properly in human being; he was denying only that nature's mechanisms had been historically superintended to that end.<sup>54</sup>

### **Superintendence, natural theology, and science in response to *Vestiges***

Whewell recognized that these problems remained philosophical until science could advance its understanding of natural history, and he recommended that the best response to *Vestiges* was to criticize its methods and hasty generalizations and to get on with surer induction, not to attempt a disproof upon the basis of existing science. Perhaps his advice was easier for a philosopher of science to give than for a "scientist" (Whewell had coined the term, and, although it did not catch on until the 1890s, we may use it here as his own<sup>55</sup>) to follow, but in any case, it is remarkable that two practicing geologists who were also natural theologians, Sedgwick and Miller, wrote lengthy replies to *Vestiges* that attempted to reach theological conclusions by detailed scientific argument. Similarly, each new edition of *Vestiges* was used by its author to incorporate better scientific arguments in its favor, even as the book's thesis was being restated in theological terms as a retort to its religious critics.

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<sup>54</sup> Powell states, for example, that natural theology "points to providential government in the preservation [of a system of causes] for the general good" (*Unity of Worlds*, op. cit. p. 171-2) and speculated that the gradual development of life on earth may have led to an "animal man" that needed only "the gift of a moral and spiritual nature" to be the image of God (*Unity of Worlds*, p. 495).

<sup>55</sup> Ross, Sidney. "'Scientist': The Story of a Word," *Annals of Science* 18 (1962): 65-85.

Through the responses to *Vestiges*, the relation of natural theology to the natural sciences would be significantly changed. Sedgwick's vast preface to the fifth edition of *A Discourse on the Studies of the University of Cambridge* and Miller's more famous *Footprints of the Creator*, as well as Powell's *The Unity of Worlds and of Nature*, were among the last works of natural theology to stem from the social and religious issues that had generated an audience for natural theology in the 1820s and 1830s.<sup>56</sup> Those issues had included promoting science within Anglican theology and institutions, especially at the universities, and extending scientific knowledge to interested, literate members of the working classes and the broader public. This had meant conflating discussions of science that were intended for a general readership with briefer theological adductions or allusions. There was no great need at the time to prepare a technical design argument out of the details of natural science.<sup>57</sup>

After 1845, however – due largely to efforts to refute *Vestiges* – natural theology became increasingly detailed, sustained, and expert in its scientific discussion. Indeed, natural theology became a means of placing scientific reputations on the line. At the same time, and very remarkably, an emergent professionalism in science was discouraging institutional connections and explicit

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<sup>56</sup> Sedgwick, *Discourse*, fifth edition, op. cit. (Ch I, note 5). Hugh Miller, *Footprints of the Creator: or, The Asterolepis of Stromness* (Boston : Gould and Lincoln; New York : Sheldon, Blakeman; Cincinnati : G. S. Blanchard, 1859).

<sup>57</sup> Topham, Jonathan. "Science and Popular Education," op. cit. (Ch I, note 14); "Beyond the 'Common Context'," op. cit. (Ch II, note 58).

references to theology and religion.<sup>58</sup> In an effort to meet the challenges of *Vestiges*, natural theologians were subjecting their readers to the demands of increasingly technical, non-theological, and professional sciences. This change was potentially determinative of the theological status of design arguments: because natural theology became more expertly scientific, therefore it became less recognizably religious, although this tendency ran directly counter to the desire of many natural theologians to provide religion with a scientific basis.

Sedgwick's *Discourse* was first given as a sermon in 1832 to the members of Trinity College, Cambridge – Whewell's college, too – and, interestingly, Sedgwick had then affirmed that the possible material development of the solar system out of nebulous matter would constitute an argument for design "by making every material power, manifested since the creation of matter, to have emanated from God's bosom by a single act of omnipotent prescience." Designed development allowed for the possibility that, when it came to the formation of the planets, material development may "be thought more in conformity with what we see of the modes of material action" than would either the immediate exertion of God's will upon matter or "an act of creative interference ... [to impress upon matter] at successive epochs ... new powers [that] *may* have brought about the next system of material conditions." The creative addition of new powers of nature was Whewell's view, of course, and Sedgwick noted that "This [last] hypothesis (though perhaps less philosophical than either of the

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<sup>58</sup> Turner, "The Victorian Conflict," op. cit. (Ch I, note 20).

other two) is supported by the analogy of the repeated changes of organic species ... each of which can be regarded only as a positive creative interference." Like Whewell, Sedgwick referred the creation of living organisms to material developments and "countless superadded powers, bound up with life and volition."<sup>59</sup>

It has been thought that the "special creation" of biological species was the last line of defense for the idea of divine creation in its long opposition to material development.<sup>60</sup> Reading Sedgwick and Whewell clearly indicates, however, that this was not the case. It is not true that Whewell and Sedgwick had been pressed to almost granting the truth of the uniformity of nature and had only special creation to rely upon for their theological argument. In fact, they hotly disputed uniformity upon geological as well as paleontological grounds. Nonetheless, cosmology and geology were far from well enough understood to afford definitive explanations, and, in this instance, the biological sciences were regarded as analogical guides to the physical sciences. This was especially important at a time when analogical reasoning and scientific method were closely associated. Divine intervention seemed necessary to the creation of species due to the paleontological evidence for repeated special creations in natural history, as well as the apparently intentional adaptation of each created species to changing terrestrial conditions caused by a cooling earth. Special

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<sup>59</sup> Sedgwick, *Discourse*, fifth edition, op. cit. pp. 24-7.

<sup>60</sup> E.g. Gillispie, *Genesis and Geology*, op. cit. pp. 219-222. Greene, *The Death of Adam*, op. cit (Ch I, note 8), pp. 1-13.



creation, therefore, in its relative certainty, provided analogical legitimacy to theories of theological superintendence in other branches of natural philosophy. Not the last, but **all** of the physical sciences were implicated in the debate over special creation.<sup>61</sup>

At stake for the theological superintendentalists was not merely the evidence for special creation, but the proper direction of analogical reasoning. *Vestiges* began its argument with a review of the nebular hypothesis of the earth's origin and used principles of material development and uniformity that seemed applicable there as the basis for a reasonable analogy to the material development of life, species, and, ultimately, human consciousness.<sup>62</sup> It was *Vestiges'* particular charge, as quoted above, that the superintendentalists changed from reasoning upon material principles in physical cosmology and geology to theological principles in biology. Although the reasoning in *Vestiges* started with the origins of the earth and was temporally sequential, it was not soundly analogical. Much more certainty or, at least, more empirical knowledge to serve inductive reasoning was available to biology and paleontology than to cosmology and geology; and, therefore, the appropriate place to begin an analogical argument that would work across the biological and physical sciences (or, in Whewell's case, within the palætiological sciences) was in biology,

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<sup>61</sup> This point is historiographically significant, because it may help to explain why, after the publication of Darwin's explanation for the origin of species, it was in the physical rather than the biological sciences that design arguments would more commonly find their basis.

<sup>62</sup> Chambers, *Vestiges*, op. cit. pp. 145-54.

working toward physics. That, at least, was the inference as pursued by Sedgwick and Whewell.

When Sedgwick argued, then, over singular biological and paleontological examples to prove that species in general had not followed one from another by progressive material development, it was not because instances of special creation were becoming increasingly hard to find in the fossil record, but because particular instantiation was an aspect of his larger analogical argument. Again, when he went into exhaustive scientific detail to pursue a theological point, it was not because *Vestiges* had made his science more difficult to defend, but because doubt about the grounds for analogical reasoning in the physical sciences could only be removed by providing relatively indubitable examples from biology and paleontology. Sedgwick had to match the level of scientific description achieved by *Vestiges*. The natural theology of his generation had not begun with the need to provide a detailed design argument, but had been brought to it.<sup>63</sup>

The importance of the sciences was increased by Sedgwick's insistence that natural theology was necessary to the support of Christian revelation. As we saw in Chapter Two, natural theologians in the 1820s and 1830s had been very concerned to secure the status of natural theology and science within Anglican thought and institutions by designating it the necessary basis for the acceptance of revelation, and it was this claim, rather than doubts about the scientific

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<sup>63</sup> Sedgwick, *Discourse*, fifth edition, op. cit. pp. xvii-cxl, ccvi-ccxxix, 176-212.

evidence for design, that had ensured natural theology a controversial response from religious traditionalists.<sup>64</sup> Indeed, Sedgwick's *Discourse* as originally written in 1832 may be characterized as a proclamation of natural theology as the new, indispensable basis for an Anglican university education. In 1849, Sedgwick was disinclined to change his view. He quoted J. S. Mill – "natural religion is the necessary basis of revealed ... [and] a school which ... denies to mankind the right to judge religious doctrine, and bids them depend on miracles as their sole guide; must, in the present state of the human mind, fail in its attempt to put itself at the head of the religious feelings and convictions of this country" – in order to say that "I agree with [Mill's] conclusion...." However, Sedgwick did find it necessary to add that natural religion was a logical but not historical necessity to the support of revelation, and he requested an allowance for miracles that were made in testament of a moral revelation.<sup>65</sup>

Sedgwick made no attempt to deny that the "creative additions" to natural history that his science discovered, and the consequent natural theology of historical superintendence, were a preparation for the acceptance of religious miracle. Nonetheless, it was not merely a linguistic trick to employ words like "creative interferences" or "special creations" rather than "miracles" when referring to science. Nominally, at least, a special creation could still be studied scientifically for the discovery of the mode or method of creation, rather than

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<sup>64</sup> E.g. Brougham, *Natural Theology*, op. cit. (Ch II, note 64). Turton, *Natural Theology*, op. cit. (Ch II, note 69). Irons, *Final Causes*, op. cit. (Ch II, note 69).

<sup>65</sup> Sedgwick, *Discourse*, fifth edition, op. cit. pp. ccxlix-cclv.

putting a stop to investigation in attestation to a miracle. Indeed, the author of *Vestiges* had claimed to be doing just that, and it was the justness of such a claim that forced the superintendentalists into scientific response. Further, even if science had nothing more to do than to acknowledge an act of creative interference, it remained a theological and not a scientific task to attribute this interference to God.<sup>66</sup>

These were not merely semantic distinctions. They adjudicated important disciplinary boundaries, not only between science and theology, but between natural theology, science, and revelation. Miracles concerned revelation. Natural theology dealt with “miracles” of a sort; or, it might be better said, with supernatural, superintendental causes; but these fell within the bounds of human knowledge of the natural order. They were evidence for the theological superintendence of natural history and were, therefore, part of a design argument, not a matter of faith. The importance of maintaining these distinctions can be seen by contrasting Sedgwick’s semantics with the science and natural theology of his younger contemporary, Hugh Miller, who earnestly obliterated the distinction between creative interferences and miracles, as well as the distinctions between science, natural theology, and revealed religion, in his *Footprints of the Creator*.<sup>67</sup>

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<sup>66</sup> The association of “special” creation with “supernatural” creation may be somewhat forced. Fundamentally, special creation referred to the creation of a new species by some means other than the transmutation of a naturally existing species.

<sup>67</sup> Miller, *Footprints*, op. cit.

Although Miller's *Footprints* is usually classified as a work of natural theology in line with those of Buckland, Sedgwick, and Whewell, this is extremely misleading. As a young man, Miller had self-consciously rejected a university education in favor of becoming a stonemason. He was self-consciously Scottish, not English; Free Church, not Anglican; and an author of newspaper articles and popular books, not philosophical papers. Although Miller shared with the others a commitment to superintendental natural theology, to confuse this simple fact with a more general identity is to lose sight of crucial distinctions in social context.<sup>68</sup>

Much natural theology in the first half of the nineteenth century had existed with reference to the integration of science into Anglican educational, political, religious, and social institutions.<sup>69</sup> Adjudicating the boundaries between science, natural theology, and theology was critical to this task because it determined the boundaries of several intellectual disciplines and spared some of the antagonism that could exist between people favoring and opposing science in religion. For example, when R. W. Church, historian and Tractarian sympathizer, admonished in a review of *Explanations* that "The *Vestiges* reminds us, if proof were required, of the vanity of those boasts which great men used to make, that science naturally led on to religion," it was **their** idea – the idea of the scientific Anglicans – not **his** idea – Church had never thought that science led to religion

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<sup>68</sup> Shortland, Michael, ed. *Hugh Miller and the Controversies of Victorian Science* (Oxford : Clarendon Press, 1996). Gillispie, *Genesis and Geology*, op. cit. pp. 170-81.

<sup>69</sup> Topham, "Science and Popular Education," op. cit.

– that was dismissed.<sup>70</sup> In many ways, *Vestiges* served Church’s purposes, because it rendered natural theology problematical and highlighted the advantages of keeping science and religion separate. Although Sedgwick was a scientific Anglican, his differentiations between science, natural theology, and revealed theology approximated to the separation of science from religion that was called for by Church and others, helping to diffuse tensions at the universities.

Miller, however, wrote as if the whole Christian religion – the religion, at least, of all who believed in the immortality of the human soul and the original fall of humanity from grace into sin – were contradicted by *Vestiges*. In his view, the developmental hypothesis “would fain transfer the work of creation from the department of miracle to the province of law, and would strike down ... all the old landmarks, ethical and religious.”<sup>71</sup> It was incompatible with the belief, “most fundamentally essential to the revealed scheme of salvation,” that humanity had been created morally upright and fallen “from this high and fair beginning.”<sup>72</sup> The developmental hypothesis must mean, also, that either the “vitalities” of fishes, reptiles, birds, and beasts “are individually and inherently immortal ... or ... human souls are *not so*.”<sup>73</sup> He thought it inconsistent with the character of the

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<sup>70</sup> Secord, *Victorian Sensation*, op. cit. pp. 256-57, quoting Richard William Church, review of *Explanations*, in the *Guardian*, 18 March, 1846.

<sup>71</sup> Miller, *Footprints*, op. cit. p. 36.

<sup>72</sup> Ibid. p. 40.

<sup>73</sup> Ibid. p. 38.

evangelical churches to "slight or overlook a form of error at once exceedingly plausible and consummately dangerous."<sup>74</sup> Powell, for one, was appalled that such "strenuous" claims, which were "a popular topic with a certain class of writers," had become "the main object" of Miller's "polemical spirit and avowed theological bias" in *Footprints*.<sup>75</sup>

Theological bias – for such it was – appeared in Miller's science, as well, when he stood the theory of progressive material development on its head and proposed the original creation of the higher members of organic classes and a subsequent "progress of degradation" to account for the later appearance of species that were lower in the scale.<sup>76</sup> Although Miller made no attempt to explain the mechanics of creation and degradation, the process, if it were true to the historical record, had the happy coincidence of disproving the developmental hypothesis and prefiguring the history of man's creation and fall, all at once. This sort of mixing of science and revelation had not been a part of academic natural theology since the recantation of geological diluvialism twenty or thirty years earlier.<sup>77</sup>

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<sup>74</sup> Ibid. p. 43.

<sup>75</sup> Powell, *Unity of Worlds*, op. cit. pp. 499-500.

<sup>76</sup> Miller, *Footprints*, op. cit. pp. 181-204.

<sup>77</sup> Henry, John. "Palaeontology and Theodicy: religion, politics and the *asterolepsis* of Stromness," in Shortland, ed. *Hugh Miller*, op. cit. pp. 151-70. Rupke, *Great Chain*, op. cit. pp. 81-88.

If the differences in style between Miller and the Anglican natural theologians of this study are not respected, then much of the pathos of nineteenth-century natural theology is lost to view. While Miller's writing was more popular and conveyed a sense of openly confronting difficulties that the Anglicans were hedging upon, there were also important differences in the relations that it presumed between religion, science, and natural theology. Miller's rejection of professional and academic interdisciplinary distinctions left him with the expectation of being proved right or wrong simultaneously in science and religion, as well as being decidedly religious in his approach to science. The expectations of Sedgwick, Whewell, and Powell, however, were less straightforward. Their commitments to science, natural theology, and religion were separable and relative, not identical; and consequently there is greater doubt in telling how their commitments to science may have affected their theology.

In the case of Powell's defense of *Vestiges*, for example, many thought he had gone too far when he suggested that designed and uniform material development was a better, more scientific argument for natural theology than were theological interventions and creative additions into natural history. Sedgwick may have thought that Powell's view, although proposed as a theistic proof, was tantamount to atheism because Powell's natural theology was not superintendental, and Sedgwick had already asked of material development (in relation to *Vestiges*) the fundamental question, "who can utter any prayer



against events chained together in the unvarying sequence of material causes?"<sup>78</sup> Perhaps that was a less rhetorical question than Sedgwick believed. After all, Powell retained his belief in miracles, although he restricted them to miracles of moral importance.<sup>79</sup> No one doubted, however, that the differences among these natural theologians had become an exercise in the interpretation of intractable details in science.

### **Huxley's review of *Vestiges*: natural theology and professional science**

Although, as indicated earlier, Huxley began his review of *Vestiges* by misconstruing its "fundamental proposition" into the unphilosophical belief that natural laws were an "entity," he did acknowledge later in the review that *Vestiges* raised a matter not "unworthy of serious attention" when it "mixed up and confounded ... the totally independent idea, which took place in far other heads – that the past may be interpreted by the present; and that the succession of phenomena in past times, took place in a manner analogous to that which occurs at the *present day*." This was a reference to Lyell's uniformitarianism, hotly disputed by the interferences and creative additions into natural history advocated by Sedgwick and Whewell. Tellingly, Huxley did not mention the controversy over the uniformitarian premise, but accepted uniformitarian analogy as "the base of the modern science of history, whether natural or civil...."

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<sup>78</sup> Sedgwick, *Discourse*, fifth edition, op. cit. p. clvi.

<sup>79</sup> Powell, Baden. *The Order of Nature Considered in Reference to the Claims of Revelation* (London : Longmans, et. al., 1859).

Implicitly, Huxley was denying that Whewell's palætiology was scientific. Huxley was no longer concerned with whether or not science must accept the uniformity of nature, but only with whether or not the presumed uniformity of nature "diminishes the 'region of marvel'" by attributing all natural phenomena to the laws of nature.<sup>80</sup>

As our study to this point has indicated, Huxley's answer to this question had to cover a lot of ground. It did so in a way that not only ignored the scientific defense of theological superintendence, but reduced it to theological insignificance. Huxley's own words best state his case:

If with Sir Charles Lyell we affirm that the physical forces at present at work are sufficient to account for the changes undergone by the earth's surface in past ages, we do not render those changes either more or less wonderful than they were before – nor do we in any way account for them – we merely state them in a readily conceivable form.

So, if with the Progressionists, we conceive that species of living beings undergo transmutation at the present day; that this transmutation is from a lower to a higher type; and that all kinds of living beings which have ever existed upon the earth's surface, have originated in this way; the idea is a perfectly legitimate one, and must be admitted or rejected according to the evidence attainable; but if fully proved, it would not be, in any intelligible sense, an *explanation* of creation; such "creation in the manner of natural law," would, in fact, simply be an orderly miracle.

...the demonstration of the analogy of two sets of phenomena, each of which is marvellous, does not ... diminish the marvellousness of either. The production of Goethe and Schiller by German civilization is analogous to that of Shakespeare and Milton by English civilization; but we do not perceive that ... either case is thereby rendered less wonderful or in any way explained.

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<sup>80</sup> Huxley, "Vestiges," op. cit. pp. 5-6.

Whether true or false, then, the scientific basis of the “Vestiges” cannot bear out its speculative conclusions; for the progression theory, if true, would be no explanation of creation.<sup>81</sup>

In this passage, Huxley has simply elided the contention of the theological superintendentalists that there cannot be an “orderly miracle,” in any theologically significant sense, if the “order” in question is an unbroken succession of physical forces and lawful events. The difference can be brought out sharply by juxtaposing the citation of Huxley with another from Sedgwick:

Activity is the very essence of intellectual power. We cannot comprehend it as quiescent. In one view we see the great animating First Cause in the laws impressed by Him on the vast bodies of the visible universe. In another view we see Him in positive acts of creative power shewn in the organs of successive animated beings brought into life during long successive periods. ...we can by our feeble ken discern ... the successive times when many successive material organic laws began...

...[*Vestiges* has stated, contrastingly,] in language that I cannot read without feelings of loathing and deep aversion (for it is irrational, ignorant, and profane) that God is not a present living providential governor of the world of nature....<sup>82</sup>

The difference between what Huxley and Sedgwick conclude about the theological significance of *Vestiges*, if material progression were true, is attributable to the fact that Sedgwick contended for proof of God’s intelligence through the active superintendence of natural history, and not in only the physical order of nature. It was facile of Huxley to reduce that contention to a

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<sup>81</sup> Ibid. pp. 6-7.

<sup>82</sup> Sedgwick, *Discourse*, fifth edition, op. cit. p. ccxxxviii, ccxli.

clarification of whether nature's laws were actual entities or generalized conceptions.

These points are of more than theological significance. Sedgwick was maintaining that the possibility of a physical uniformity to the order of nature was disprovable by physical evidence taken from the sciences of natural history that pointed to the materially unprovoked creation of new phenomena and the appearance of new laws and orders of nature. Huxley, on the other hand, understood such historical discontinuity to be a violation of the basic premise of the historical and natural sciences. This was coupled with the assertion that uniformity was no less "marvellous" than discontinuity. At one stroke, by his review of *Vestiges*, Huxley had dismissed Sedgwick's views from the realm of the scientific and rendered them theologically insignificant. A clearer instance of the marginalization of superintendental natural theology by new interests in science, and of the divestiture of natural theology's religious significance, would be difficult to find, despite the fact that Huxley went out of his way to make this marginalization seem religiously appealing.

The transference of authority in science from Anglican natural theologians like Sedgwick to lay professionals like Huxley was far from a *fait accompli*, however, in 1854, and Huxley's dismissal of theological superintendence was not without risk. Undoubtedly, that was why Huxley ignored the superintendental controversy in his review of *Vestiges*. He could hardly count on Sedgwick not to notice, however, and Huxley addressed that difficulty in the last pages of his

review by affirming Sedgwick's scientific reputation against that of the anonymous, but professedly amateur, Vestiginarian. "The author of 'Vestiges,'" wrote Huxley, "... complains bitterly of the [unphilosophical] tone adopted by ... Professor Sedgwick. The handling of the Woodwardian Professor may have been a little more rough than should beseem a Cambridge Don: but to a thorough, an earnest, and above all, a genial man, who has made truth the search of his life, and knows the difficulties of the road and the stern practical discipline required for success – to such a man ... there is a source of wrath, such as the author of the 'Vestiges' is obviously quite unable to understand ... who would have been an astronomer – but for sitting up at night; a geologist – but for soiling his fingers; ... [and who attempts] to divide the spoil he was incompetent to win...."<sup>83</sup> Huxley was not only gratifying Sedgwick with this passage (and libeling a hardworking professional journalist), but was also converting Sedgwick's theological loathing of *Vestiges* into the wrath of a fellow professional in science.

At this stage of the game Huxley was evidently willing to share the spoils of science with clerical dons. The first division he had proposed between religion and science was not between clerical and lay professionals, nor was it between ecclesiastical defenders and honest critics of religious truth. Those distinctions would come later and were more blatant. Huxley's first target was more subtle and more subtly attacked: there was to be no reference within professional science to the natural theology of historical superintendence, and Huxley

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<sup>83</sup> Huxley, "Vestiges," op. cit. p. 18.

attempted to flatter the scientific superintendentalists into passing this admission. Remarkably, it was at this time that natural theologians, in response to *Vestiges*, were becoming increasingly bound to the language and demands of Huxley's new professionalism. Huxley's sly elision of natural theology was in sharp contrast to the expressed challenge to superintendence that had been at the heart of the sensational argument of *Vestiges*.

Historians have not always appreciated that Huxley gave at least limited and implicit expression to his views on natural theology before he was acquainted with Darwin's theory. By 1854, as this chapter has shown, Huxley was sufficiently expert in the jargon of natural theology to effectively misrepresent its theological importance and its considerable basis in science and, at the same time, mask this misrepresentation from all but the most philosophically expert audience. Moreover, the basis for Huxley's misrepresentation was a determined ignorance, rather than an evidential disproof, of the scientific argument in favor of the theological superintendence of natural history.

## CHAPTER IV:

### HUXLEY, NATURAL THEOLOGY, AND PROFESSIONAL SCIENCE PRIOR TO THE PUBLICATION OF *ORIGIN OF SPECIES*



**Thomas Henry Huxley**

Chapters Two and Three studied the scientific and religious status of natural theology in Britain as Huxley, a prototypically positivistic and professionalizing “man of science” in Britain, would have found it early in his scientific career, before he was acquainted with Darwin’s views. That study is now complete except for a mention of the “ideal” or “archetypal” form of natural theology that was most nearly related to Huxley’s own scientific practices and

theories.<sup>1</sup> Chapter Two determined that the proliferation of British natural theology in the 1820s and -30s was partly impelled by efforts to liberalize the Anglican establishment by making theology more scientific and less textual. The association of liberal Anglicanism with science and superintendential natural theology was noted; and the widely accepted view of natural theology as a reconciliation of science to religion was tempered by noting that natural theology often represented not merely reconciliation but the identification of theology and science, as well. By the end of the 1830s, natural theology stood publicly for science and liberalism in religion. It was controversial upon religious and political rather than scientific grounds.

Chapter Three noted that Robert Chambers' *Vestiges* publicized a natural theology of designed development that questioned the scientific validity of superintendence. Attempts to refute *Vestiges* introduced disputed and technical points of science into design argument, abstracting natural theology from the public and religious discourse that had provided its earlier context. At the same time, an emergent professionalism was furthering the distinction of science from religion. Rather than becoming less plausibly and professionally related to science in the 1820s, -30s, and -40s, as is often assumed, natural theology by the 1850s was embedded within the most intractable problems of science, and,

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<sup>1</sup> Desmond, Adrian. *Archetypes*, op. cit. (Ch I, note 11). Mario Di Gregorio, *T. H. Huxley's Place in Natural Science* (New Haven : Yale University Press, 1984), pp. 3-82. Sherrie Lyons, *Thomas Henry Huxley: the evolution of a scientist* (Amherst, NY : Prometheus, 1999), pp. 49-90.



although it retained its theological relevance, its arguments were increasingly associated with scientific debates and with the philosophy and history of science.

Huxley's professional reputation was being forged at this time, and his initial public response was to elide natural theology's scientific importance and recommend its religious inconsequence. His concern was to spare science from theological implication – especially, from superintendential implication – and this, remarkably, had as much in common with the defenders of traditional, textual religion as with the liberal and scientific Anglicans who were Huxley's professional colleagues. Natural theology placed Huxley in a bind: it promoted science but only within the context of the Anglican political and social network whose constraints were keenly felt by a scarcely middle class, self-made professional aspirant. Huxley wanted his science unfettered by religion, and natural theology stood in the way of his desire.

Our next step, undertaken in Chapters Four and Five, is to examine the difference made by Darwin in Huxley's reckoning with natural theology. Sherrie L. Lyons has argued that Huxley's support of Darwin was part of a larger preference for naturalism, and a corresponding rejection of natural theology, that played a constructive role in Huxley's scientific thinking. From among viable scientific views, Huxley selected those that were least implicative of theology.<sup>2</sup> Lyons's thesis has placed Huxley's practical science under the sway of the philosophical naturalism and personal anti-clericalism that often have been noted

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<sup>2</sup> Lyons, *op. cit.* pp. 111-58; 275.

as the source for his extra- or meta-scientific thought. Huxley's science, in other words, was largely, practically, and from the beginning concerned with advancing ideas in science that limited or excluded appeal to natural theology. Given Huxley's professional bind in science and religion, it is not surprising that this should be so.

However, although it is correctly noted that Huxley's negative attitude toward natural theology was practically constructive of his science, nonetheless, Lyons has gone too far in suggesting that Huxley was philosophically opposed to natural theology. In fact, Huxley stated that he never had been philosophically opposed to naturalistic arguments for the existence of God, so long as there was scientific evidence in support of the argument.<sup>3</sup> Further, when Huxley expressed his opinion that there was no evidence of that kind, his claim was generally restricted to the natural theology of superintendence, which pretended to find scientific support for directed discontinuity (or, to phrase it less favorably to a scientific appeal, for supernatural interposition) in natural history.

Huxley rejected superintendence upon the grounds of its appeal to a supernatural cause. However, as we shall see, Huxley's later understanding of evolution not only tolerated but was premised upon the possibility that the natural order had developed gradually and along a materially predetermined course. This view was amenable to a non-superintendential design argument.

Additionally, Huxley's conceptions of empiricism and scientific proof allowed or

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<sup>3</sup> Lyons, p. 263-78; Huxley, "On the Reception of *The Origin of Species*," in *Life and Letters of Charles Darwin*, two volumes (London : John Murray, 1887), i, p. 541; *CE V*, pp. xiv-xvi.

even required him to debate with the superintendentalists when they argued upon empirical grounds.<sup>4</sup> These basic ties to design argument conflicted with Huxley's intention of freeing science from theological implication and allowed for the difference that Darwin would make in Huxley's views.

Darwin would provide Huxley with an empirical and scientific, and not merely a practical and personal basis for rejecting the natural theology of superintendence. (Darwin's theory made it possible to dispute designed development no less, but Huxley was insufficiently adherent to his friend's hypothesis to follow it to that conclusion.) Further, Darwin provided Huxley with a nearly unassailable example of scientific objectivity in matters of natural theological but not explicitly religious importance.<sup>5</sup> Nonetheless, the argument of *Origin of Species* was deeply indebted to British natural theology, and Darwin's hypothesis explicitly competed with utilitarian design argument and the claims of special creation in attempting to correctly interpret the evidence or "facts" of natural history.<sup>6</sup> Although Huxley's earlier predilection had been to spare science from all theological implication, continuing in that way would be impossible if Huxley were to defend Darwin's science from attack or misrepresentation.

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<sup>4</sup> Di Gregorio, Mario. *T. H. Huxley's Place in Natural Science* (New Haven : Yale University Press, 1984), pp. 60-65.

<sup>5</sup> Paul White, *Thomas Huxley: making the "man of science"* (Cambridge : Cambridge University Press, 2003), pp. 58-66.

<sup>6</sup> Whether natural theologians exerted a constructive influence upon Darwin is disputed by Phil Diamond, "The Natural Theologians and Darwin: a case of divergent evolution in the history of ideas," *Australian Journal of Politics and History* 26 (1980): 204-11. This qualifies but does not deny the importance of natural theology to the development of Darwin's theory, as studied by Ospovat and others. See Ospovat, *Darwin's Theory*, op. cit. (Ch II, note1).

How and why did Huxley relate Darwin and evolution to religion? All that can be safely said at the outset is that he did so controversially. Older ideas of Huxley as a champion of objective truth against religious obfuscation have been falsified by recent scholarship in so many ways that it becomes tedious to enumerate them. It is no longer credible to claim that Huxley acted purely in the interests of truth, science, and Darwin.<sup>7</sup> Historians have demonstrated that Huxley's personal interest in the monetary, political, and social fortunes of scientific professionalism ran counter to many of the monetary, political, and social interests that had been traditionally reserved to the clergy.<sup>8</sup> It has been argued that Huxley's agnosticism and scientific naturalism were useful in a war of words against the clergy but failed to provide an epistemological basis for science that was proof against the criticisms he leveled at religion.<sup>9</sup> Moreover, it has been maintained that evolution was as much a "religion" to men like Huxley as was Christianity to its adherents. Rather than presenting us with anything as simple as an evidential controversy or even a professional rivalry between science and religion, the Victorian debates may have been a conflict of

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<sup>7</sup> Jensen, *Thomas Henry Huxley*, op. cit.

<sup>8</sup> Turner, "The Victorian Conflict," op. cit. (Ch I, note 20); and "Rainfall, Plagues, and the Prince of Wales," in *Contesting Cultural Authority*, op. cit. (Ch I, note 20), pp. 151-70. Russell, "The Conflict Metaphor," op. cit. (Ch I, note 21). James R. Moore, "Crisis without Revolution: the ideological watershed in Victorian England," *Revue de synthese* 4 (1986): 2-28.

<sup>9</sup> Lightman, Bernard. "Pope Huxley and the Church Agnostic: the religion of science," *Historical Papers* (1983): pp. 150-63.

worldviews with fundamentally different understandings of what science and religion were.<sup>10</sup>

Although Chapters Four and Five study Huxley, evolution, and religious controversy within this larger historiographical context, they focus narrowly upon the significance of natural theology for Huxley's thought, leaving open the question of how that may be related to the broader concerns of science and religion. They accept natural theology as Huxley found it: a problem of more scientific moment than he would admit and with political and social implications that chafed. Moreover, although "science" was at this time a very broad category with moral as well as physical significance, my chapters are concerned only with ideas in the evolution of species as Huxley considered them with reference to biological science and theological controversy.

My thesis now, to be sustained over the course of Chapters Four and Five, is that the publication of *Origin of Species* brought Huxley into the existing tide of natural theological debate rather than opposing him to it. There is considerable evidence *prima facie* against this thesis. There is, for example, Huxley's famous charge that he would be less ashamed of descent from an ape than from a natural theologian.<sup>11</sup> Nonetheless, the remarkable fact is that

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<sup>10</sup> Ruse, *Evolution-Creation*, op. cit. (Ch I, note 15), especially at pp. 89-96.

<sup>11</sup> Although Huxley's retort to Bishop Samuel Wilberforce is generally remembered as confronting a clergyman, the immediate context was Wilberforce's defense of natural theology and critique of Darwin's ideas at the 1860 annual meeting of the British Association for the Advancement of Science. Many years later, Huxley wrote that he had preferred an ancestral ape to "a man ... [who would] distract the attention of his hearers from the real point at issue by ... skilled appeals to religious prejudice." Thomas Henry Huxley, ed. Leonard Huxley, *Life and Letters of T. H. Huxley*, two volumes (New York : D. Appleton & Co., 1990), i, p. 199.

Huxley, upon acquaintance with Darwin's views, changed from the public dissociation of science and religion that was evident in his 1854 review of *Vestiges*, to a public insistence that science and religion were "twin sisters [whose] ... separation is sure to prove the death of both," and that "[i]t is the duty of the general public to await the results [of science] in patience" in determining Darwin's general significance.<sup>12</sup> Although it would be easy to interpret this as honing Darwin against religion – a view for which, again, there is considerable evidence *prima facie* – a close examination of Huxley's morphological science, his interpretation of the natural philosophies upon which his morphology was built, his early acceptance and defense of Darwinism, and the significance of all of this for religious and natural theological debate will demonstrate that Huxley's defense of Darwin was consistent with pre-Darwinian tendencies in natural theology. Moreover, Huxley's defense of Darwin caused him, for the first time, to admit and attempt to delimit the role of natural theology within science. Although Darwin provided Huxley with a weapon against the most overtly religious aspects of natural theology – such as special creation – that weapon was not used to attack the scientific status of design arguments wholesale but to acknowledge, redefine, and preserve the integrity of past and continuing scientific debates that were of natural theological moment. Stated simply: Huxley needed to admit natural theology (or design argument) as a matter of science in order to explicate and defend "the Darwinian hypothesis."

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<sup>12</sup> T. H. Huxley, "Science and Religion," *The Builder* 17 (1859): 35; "Time and Life: Mr. Darwin's 'Origin of Species'," *Macmillan's Magazine* 1 (1859): 148.

He was willing to do so because religious controversy over special creation and evolution were making it untenable that natural theology would any longer provide the basis for an Anglican or religious comprehension of the institutions and ideas of science. Carefully controlled, the scientific ideas of natural theology (its design arguments) could be used to distinguish between natural theology's significance for science and for religion, and, eventually, to help in the liberation of science from the social and institutional constraints of religion.

Chapter Four will show that Huxley's scientific views prior to the *Origin* were deeply implicative of natural theology, despite Huxley's strong and opposite determination. This is not a matter of only noting that Huxley's morphological science was closely allied to nineteenth-century German transcendental idealism and was, consequently, susceptible to interpretation as a form of design argument – a fact that is now widely known.<sup>13</sup> Rather, I will attend to Huxley's expert attempts to differentiate science from natural theology through novel interpretations of continental natural philosophers such as Cuvier and von Baer. Huxley had little success in these attempts to separate science from natural theology because of the willingness of other British men of science, such as his influential rival Richard Owen, to point out design arguments where Huxley had left them hidden. Nonetheless, Huxley's habit, to be studied here, of drawing attention away from design arguments in physical science whenever he could will

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<sup>13</sup> Desmond, op. cit. Di Gregorio, op. cit. Lyons, op. cit.

still be noticeably in play when, in his defense of the *Origin*, he is forced to admit the relevance of design arguments to the study of natural history.

### **Huxley's early science and its relation to natural theology**

A largely unrecognized value of Huxley as the subject of a study in science and religion is the great variety of ways in which his science was engaged by natural theology. Whether design was considered evident in biological science because of organic adaptive utility, special creation, the progressive development of the earth, the progression of organic species one from another, the laws of organic development, or – most importantly for Huxley – the formal relationships between different “types” of organisms, Huxley’s science was accountable in some way. His later evolutionary views, too, were theologically interesting. He was an outspoken critic of transmutation who changed methodically, from 1857 to 1869, into a professed evolutionist possessing a keen understanding of Darwin and, often less apparently, an inclination to non-Darwinian evolutionary theories that were more or less amenable to design argument.<sup>14</sup>

Although Huxley’s ideas in science placed him at the center of the most interesting natural theological debates of his time, his social circumstances were more marginal. His financial and professional fortunes were never entirely secure. He was never a professional “scientist” because there was no such thing in his lifetime. Neither was he a member of a recognized secular profession such

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<sup>14</sup> Di Gregorio, op. cit. pp. 3-128. Lyons, op. cit. pp. 37-85; 189-230; 288-78.



as the legal or medical, nor a clerical (ordained) natural philosopher, recipient of ecclesiastical patronage, or gentleman of independent means; but he sought, successfully, to invent the professional “man of science” out of aspects of these.<sup>15</sup> Significantly, each existent model for Huxley’s ideal profession was capable of definition by its relation to natural law and natural theology, which was an important credential within the Anglican establishment and under the general tenets of religious meaning that were a presumption of Victorian times. Huxley’s professional science was intractably and consequentially related to natural theology. His alternating displays of reticence and determination in speaking to religion always must be understood in that way.

Huxley’s pre-Darwinian science was primarily concerned with zoological morphology – the examination and explanation of animal form. Largely self-taught, Huxley had studied Cuvier and the German natural philosopher Karl Ernst von Baer to especial profit.<sup>16</sup> Significantly, as we saw last chapter, Cuvier’s geological studies had been the basis for the theories of the English catastrophists and superintendentalists; and in the biological sciences, too, Cuvier was known in Britain as a favorite of natural theologians. His morphological dictum had been that “form follows function,” which could be expounded in utilitarian terms to mean that animal forms had been “designed” to meet the “conditions of existence” under which different “types” of animals lived.

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<sup>15</sup> White, *op. cit.*

<sup>16</sup> Di Gregorio, *op. cit.* pp. 3-35; Lyons, *op. cit.* pp. 49-90.

Cuvier's functional morphology is often thought to have imitated the views of Paley's *Natural Theology*, but that is an unfortunate conflation. Paley's utilitarian design argument had explained specific zoological organs, such as the human eye, in the same mechanical terms that were applicable to pocket watches and telescopes; but Cuvier had explained zoological form in terms of general typologies, and it was because he had generalized that Huxley could learn from him. For example, in an important and possibly accurate critique of Cuvier's methods, Huxley argued that Cuvier's proven ability to predict the form of an unknown animal from a bone or fossil fragment was not attributable to the idea that all typical aspects of animal form were functionally interrelated, as Cuvier had claimed, but to the knowledge, gained by Cuvier from practical experience, that certain body parts were invariably found in certain types of animals and never in others.<sup>17</sup> Specific and more general animal types, in other words, were not identifiable by a common utilitarian design but by an entirely formal typology that could be studied without reference to adaptations and conditions of existence.

Huxley's reinterpretation dissociated Cuvier's science from Paley and utilitarian natural theology. However, it also illustrated how strands of science and theology had been knotted together in Britain in ways that disturbed Huxley and have confounded historians ever since, making a fine historical understanding of Huxley's relation to natural theology nearly impossible. For

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<sup>17</sup> Di Gregorio, pp. 15-35. Lyons, pp. 54-8.

example: although it was theologically less innovative than had been Buckland's derivation of a superintendential design argument from Cuvier's geological theories (a topic of Chapters Two and Three), Cuvier's morphology had provided the basis for Buckland's imaginative recreation of an extinct "ante-diluvial" fauna in the celebrated book *Reliquiae Diluvianae* (1823).<sup>18</sup> Buckland's title, which translates as "relics of the flood," has confused historians into considering it a work of catastrophical geology. In fact, it was primarily an extension of Cuvier's morphological premises into problems in paleontology: Buckland studied the remains of various animals that presumably had been made extinct by the flood and surmised how they had once lived.<sup>19</sup> Had *Reliquiae* supported a natural theology, it would have led most expediently, not to geology, catastrophism, and superintendence, but to the application of Paley's utilitarian design argument to specific extinct organic forms; and Buckland did in fact write a great deal of natural theology that explained specific adaptations to lost environments.<sup>20</sup> *Reliquiae*, however, was not a natural theology, neither utilitarian nor superintendential. Apart from its scientific content, its theological claim was that geological and literary evidence coincided in testifying to a recent, global flood. *Reliquiae* was diluvialism, not design argument. It attempted to subordinate

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<sup>18</sup> Buckland, *Reliquiae*, op. cit. (Ch II, note 7).

<sup>19</sup> Rupke, *Great Chain*, op. cit. (Ch I, note 10), pp. 29-41.

<sup>20</sup> *Ibid.* pp. 231-54.

natural philosophy to the educational tradition of classical textual studies through a reconciliation of Genesis to geology (see Chapter Two).

Although *Reliquiae's* significance for natural theology was negligible, it has served to funnel the unfortunate association of Cuvier with Paley, catastrophism, and the Genesis and geology controversy, mixing what were distinct aspects of scientific and religious thought. Although historians today still confuse Cuvier, Paley, catastrophism, and Genesis and geology, they were distinct in Buckland's mind, and Huxley was able to treat them distinctly as well. Cuvier's morphological interest had been the formal relationships between specific and ever more general zoological "types." That was Huxley's interest, too, and it differed from what Paley had explained by design. Through his reinterpretation of Cuvier, Huxley could claim that Paley's utilitarian design argument, which was impressive as an explanation for specific zoological features such as eyes, had been of no use in describing other and more general aspects of animal form. However, Huxley's reinterpretation of Cuvier offered no alternative to Paley's utilitarian explanation for the form and function of specific organs; rather, it concluded that utilitarian design was unimportant to the study of general morphology. Paley was not disproved but made irrelevant to Huxley's scientific project, a turn that is consistent with a practical determination to avoid natural theology in science.

What Huxley thought relevant was the embryological typology of the German natural philosopher von Baer. Von Baer had written against the idea that

zoological species progressed one from another, from lowest to highest type, like a "great chain of being." Although the progression of type had never received much play in Britain (aside from *Vestiges*), it had been important to the romantic natural philosophy of the German idealists that had nurtured von Baer, and it had taken encouragement from the observation that the embryos of higher animals seemed to progress through stages of development that resembled the adult forms of lower animals. This progression suggested an argument for natural theology by implying that lower zoological forms had somehow been intended to become their next higher type.

However, von Baer claimed that embryological development was not a progression from lower to higher type. Rather, embryos first displayed the most general features that were characteristic of their type and gradually acquired more specific characters until fully and individually formed. Von Baer described this development not as the progression of type but as the divergence of features characteristic of specific types from those that were characteristic of more general types of animals, "so that the same type may exist in many grades of [embryological] development."<sup>21</sup> Determining taxonomic classifications did not involve comparing the adult forms of lower types to the embryonic forms of higher, but was an abstract comparison of all embryos that displayed similarity of form, regardless of the embryo's degree of development in relation to adults of its type. The divergence of human from piscine embryos, for example, took place

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<sup>21</sup> Lyons, op. cit. p. 60.

at a fairly early stage in the development of these two distinct but related vertebrate types.<sup>22</sup>

On von Baer's scheme, embryonic development could only be said to "progress" toward its adult form; there was no progression of type. Since "progress" is a teleological concept that implies an intention, end, or goal, denying progression of type undercut a great deal of theological language. It could not be said upon the basis of von Baer's embryological typology, for example, that fish were intended to progress into mammals and mammals into humans. All that could be said was that humans and fish at one point shared an embryological form that was common to vertebrates. Huxley's acceptance of von Baer's typology separated general morphology from the natural theology of typological progression, similarly to the way reinterpreting Cuvier had dissociated general morphology from the logic of utilitarian design.

Nonetheless, as was true of his dismissal of organic utility, Huxley's case against typological progression had limits. In Britain, the ideal "chain of being" had been less important to the idea of progress than had the suggestion of God's superintendence of natural history – what Rupke has called "the chain of history."<sup>23</sup> As we saw in previous chapters, the superintendentalists proposed that God had staged repeated creations and extinctions throughout natural history with the ultimate intention of creating a world fit for human habitation.

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<sup>22</sup> Di Gregorio, *op. cit.* 28-35. Lyons, *op. cit.* 60-66.

<sup>23</sup> Rupke, *op. cit.*

The superintendentalists based their claims upon the empirical evidence of geology and paleontology conjoined to the theory that a “cooling earth” had grown increasingly hospitable of life over time. Although von Baer’s typology freed morphology from the typological progression of the German idealists, it did not address the claim of the overall “direction” of natural history that was supported by the empirical science of the British superintendentalists. In fact, because Huxley preferred not to acknowledge the possibility of natural theology within natural history, the paleontological record was forcing him to argue against very plausible physical evidence for some kind of historical progress or advancement in the forms of life.<sup>24</sup>

Although Huxley had some success in separating morphological science from natural theology, he could do little to subvert either Paley’s explanation of specific organs or the superintendentalists’ explanation for the directional progress of natural history. Further, it is possible that Huxley’s quibbles with theology were narrowing rather than expanding his scientific horizons: in the 1850s, he was ignoring specific utilitarian adaptation as a morphological feature and was among the most obdurate holdouts against the fossil evidence for life’s journey from simpler to more complex forms.<sup>25</sup> This may be rephrased to say that Huxley was ignoring the problems that Darwin would solve, because adaptation and the suggestively ‘progressive’ paleontological record of special

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<sup>24</sup> Lyons, 111-123.

<sup>25</sup> Di Gregorio, 114-118.

origins and extinctions were among the more significant aspects of natural history that Darwin would attempt to explain. Remember, too, that Darwin's science was profoundly considerate or, perhaps more aptly stated, re-considerate of natural theology, because, as Dov Ospovat has shown, the logic of natural theology was deeply ingrained within Darwin's thinking.<sup>26</sup> Prior to Darwin, Huxley had no way to counter the explanations of natural history that were offered by the natural theologians, and, although he was committed to the opportunistic and selective dissociation of natural theology from science, he often found it convenient to ignore problems that natural theology, perhaps, but not yet physical science might explain.

Before we consider Darwin, however, it is important to note some of the practical ways in which natural theology impacted Huxley's early scientific career. Huxley's chief rival for notoriety in science was his elder contemporary, Richard Owen. Although the two men were similar in their scientific thinking, Owen began his scientific career twenty years before Huxley and pursued success in a different way. An important component of Owen's success was his negotiation of the system of Anglican patronage.<sup>27</sup> It would be Owen, for example, who would coach Bishop "Soapy Sam" Wilberforce in his defense of natural theology against Darwin (although Owen in fact saw much to envy in Darwin's theory). This social maneuverability was something more than a professional necessity to Owen; it

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<sup>26</sup> Ospovat, *Darwin's Theory*, op. cit. (Ch II, note 1).

<sup>27</sup> Desmond, *Archetypes*, op. cit. Desmond's view is moderated by Rupke in *Richard Owen*, op. cit. (Ch I, note 13), pp. 161-219 at 203-04.



was a part of the culture that was a premise of his success. For example, at one time the young Huxley requested of Owen a letter of introduction, and Owen delayed for weeks in order to emphasize the significance of replying, "I shall *grant* it."<sup>28</sup> Huxley was turned impotently furious by Owen's frank affirmation of patronage in science.

Given his ecclesiastical connections and loyalties, it is no surprise that Owen was a skilled proponent of natural theology. What is remarkable, however, is that Owen exploited precisely the arguments for natural theology that Huxley, with equal skill, was diverting from recognition by science. For example, although Huxley could insist that organic types did not "progress," he could not deny that there were many levels of orderly and formal resemblances between the types. In fact, before Darwin stirred his transmutation into an evolutionist, Huxley's scientific ambition was to specify the organic "laws" that determined the formal and presumably fixed relationships between specific and more general morphological types. Huxley envisioned this science as a kind of organic geometry. The relationships between types were to be defined as abstract "general plans" upon which the next more specific types were variably constructed, or, more accurately stated, to which the specific types could be generally reduced.<sup>29</sup> This was an essentially Platonic understanding of morphology, and Owen – whose work preceded Huxley's in this regard – did not

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<sup>28</sup> Lyons, op. cit. p. 197.

<sup>29</sup> Lyons, 66-72. Di Gregorio, op. cit. 33-34.

hesitate to claim that the general plans were “Archetypes” present to the divine mind and serving to direct or guide the progress of natural history. Huxley viewed the general types as descriptive but not determinative of organic form, and he did not view discovering the determinate causes of types to be a matter of immediate scientific concern.<sup>30</sup>

Although Huxley complained that Owen’s metaphysical archetypes were not in the “spirit” of inductive science, he could not deny their philosophical and theological legitimacy.<sup>31</sup> In fact, the Oxford geometer and philosopher Baden Powell requested from Huxley an account of morphology’s organic schematics to ensure the scientific caliber of a design argument that Powell, as discussed briefly in Chapter Three, was premising upon “order” rather than “intention” in nature. Remarkably, Powell published Huxley’s reply as an appendix to his theological treatise *The Unity of Worlds and of Nature*. Despite his vigorous efforts to dissociate science from religion, Huxley’s pre-Darwinian science is, literally, a chapter of nineteenth-century natural theology.<sup>32</sup>

Owen represented much worse to Huxley than this, however, because Owen was able to accommodate Huxley’s morphological science not only to an orderly but also a superintendential view of natural history. As has been said, Huxley was able to ignore but not explain the fact that all organisms were

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<sup>30</sup> Di Gregorio, p. 15-35, 114-120.

<sup>31</sup> Ibid. p. 43.

<sup>32</sup> Powell, *Unity of Worlds*, op. cit. (Ch III, note 47), pp. 537-9.

specifically adapted to the conditions of their existence; and he found it much easier to deny the validity of “progress” in its typological sense than when the superintendentalists meant the “general direction” of natural history evident in the paleontological record. Owen had none of Huxley’s theological antipathies, however, and could make hay of the fact that the various understandings of “design” in nature – the organic schemata, the “direction” of natural history, and the utilitarian adaptation of specific organisms to their environment – were not competitive but potentially complementary arguments in natural theology. In an often quoted and indefinitely suggestive passage, Owen wrote:

To what natural laws or secondary causes the orderly succession and progression of such organic phenomena may have been committed we are as yet ignorant. But if, without derogation of the Divine power, we may conceive the existence of such ministers, and personify them by the term “Nature,” we learn from the past history of our globe that she has advanced with slow and stately steps, guided by the archetypal light, amidst the wreck of worlds, from the first embodiment of the Vertebrate idea under its old Ichthyic vestment, until it became arrayed in the glorious garb of the Human form.<sup>33</sup>

Owen’s “wreck of worlds,” written in 1849, was a timely reference to John Bird Sumner, made the Archbishop of Canterbury in 1848. Sumner had written thirty years earlier that “we are not called upon to deny the possible existence of previous worlds, from the wreck of which our globe was organized,” a passage that Buckland had quoted in 1819 in vindication of teaching geology at Oxford. Significantly, in 1845 Buckland had removed from Oxford in a controversial

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<sup>33</sup> Owen, Richard. *On the Nature of Limbs* (London : van Voorst, 1849), p.86, as quoted in Desmond, *Archetypes*, op. cit. (Ch I, note 11) p. 47.

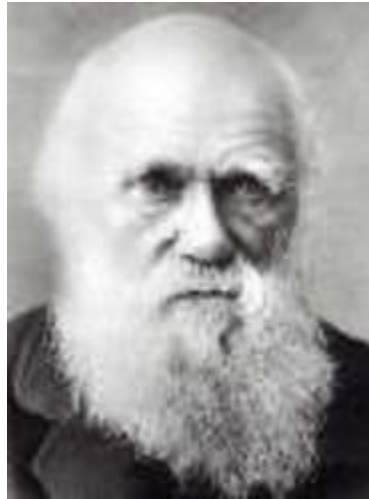
appointment to be Dean of Westminster in London.<sup>34</sup> The “wreck of worlds,” then, was a notable indication of how Owen could publicly relate archetypal to superintendental natural theology, secular science to clerical politics, and natural theology to scientific and religious discourse. Despite a strongly opposite determination, Huxley’s archetypal morphology could be smothered by theological implications; and the man most capable of this performance was Owen, a professional and personal nemesis and an agent of the religious establishment. In the 1850s, Huxley badly needed an escape from under the biological supports of natural theology; yet his scientific views made this impossible. He had reason to cheer the appearance of *Origin of Species*.

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<sup>34</sup> Buckland, *Vindiciae*, op. cit. (Ch I, note 29), pp. 26-27.

## CHAPTER V:

### NATURAL THEOLOGY AND HUXLEY'S DEFENSE OF *ORIGIN OF SPECIES*



**Charles Darwin**

This chapter continues the immediately previous in maintaining that mounting a defense of *Origin of Species* brought Huxley into the existing tide of nineteenth-century natural theological debate rather than opposing him to it. However, although Chapter Five furthers the thesis of Chapter Four, it is kept structurally apart because it will draw significantly upon the work of Chapters Two and Three, as well.

As we have seen, Huxley's best pre-Darwinian efforts to differentiate natural science from utilitarian, superintendental, and developmental design arguments had met with limited success. In 1854, Huxley's scientific work

remained thoroughly enmeshed by the natural theology of his day. It remains for Chapter Five, then, to show that Huxley very well appreciated the anti-teleological significance of the *Origin*, and that he employed this appreciation in defending Darwinism against specific forms of theological and teleological interpretation and misinterpretation. In defending Darwin's views, Huxley would play different forms of design argument against one another as part of a rhetorical strategy that emphasized the distinction of science from religion. Chapter Four showed that Huxley had employed a similar strategy in his interpretation of Cuvier and von Baer even before being acquainted with Darwin's theory of evolution. The difference in Darwin's case, however, is that points of natural theology were no longer implicit within Huxley's public consideration of biological science, but quite explicit.

As we saw in Chapter Three, Huxley understood that natural theology was a point of controversy with non-scientific theologians whose preference was to place science at a remove from more traditional and textual forms of theology. Huxley's published view in 1854 was that science was of little concern to religion and theology – that creation by "development," for example, was no less "marvelous" than a special creation and was not an "explanation" of creation in any way of concern to religion. This view closely echoed what a traditional theologian might have said at that time, if, by "traditional," we mean less scientifically and more textually and traditionally concerned. Nonetheless, in 1854, Huxley had not been choosing a theological side to play on, whether

effectively scientific or traditional. His constant intent had been to liberate science from theology and religion or, stating the same thing more accurately, to create a new, secular, non-theological and professional science out of various parts and aspects of the Anglican political, religious and educational establishment. This had meant wresting concessions from scientific and traditional theologians alike in the interests of professionalizing science.

It may not be assumed then, that “science,” “religion” and “theology” represented defined, identifiable and stationary targets for Huxley to defend or attack with new Darwinian weapons once *Origin* was published. The *Origin* was a theoretical or hypothetical natural history that was published in mid-nineteenth-century Britain; and, as such, it appeared within – it was an aspect of, a continuation of, a line of – public theological controversy until something could be done to set it apart. Recent historical scholarship has determined that much of the work of separating science from religion in the public mind was done before Darwin published the *Origin* and in consequence of the sensational controversy over *Vestiges*. However, no one could have been certain of this at that time. Moreover, the lines of differentiation between science and religion were crossed and complicated by the status of natural theology within science, religion and public life in Britain. Utilitarian design arguments seemed antiquated by 1859 through long association with biblical special creation, but there was a place for them yet within superintendential natural theology and natural history. Developmental natural theology seemed theologically, socially and scientifically

heterodox because of its association with *Vestiges* but, even so, had had an important public advocate in the Anglican natural theologian Baden Powell. Moreover, Huxley came into the controversy willing – as demonstrated by his review of *Vestiges* (Chapter Three) and his interpretations of Cuvier and von Baer (Chapter Four) – to negate natural theology within scientific discourse by rejecting one form of design argument while standing implicitly upon the grounds of another. For all of these reasons, it is unsound to believe that the Darwinian controversies were hardly more than an echo of the *Vestiges* controversy and of relatively small consequence to the history of science and religion.

In his public defense of *Origin*, Huxley would represent evolution in ways that were not entirely compatible with Darwin's own views and that, moreover, did not differ greatly from the "developmental" understanding of natural history that had outlasted its initial, even regrettable presentation in the much maligned *Vestiges*.<sup>1</sup> Moreover, Huxley's understanding of the role of variation within evolution differed from Darwin's in ways that Huxley recognized would imply a new or, at least, a non-utilitarian natural theology. He responded to these challenges in a familiar way, by pitting one form of design argument against another. This placed Huxley's defense of Darwin firmly within the terms of the debate between "developmental" and "superintendental" natural theologies that had been significant in Britain for the previous two decades. What was new in

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<sup>1</sup> *CE II*, p. 13-14, 222-223, 237-38; *CE IV*, p. 55. However, see *CE I*, pp. 100-104.



the defense of Darwin, however, was Huxley's willingness to acknowledge that design argument and, implicitly, natural theology had held important places within the history of science, and to admit, as well, that natural science impacted severely upon matters that were of proper concern to religion and theology. Attention to those novelties in Huxley's public discourse is now necessary.

### **Natural theology and science in Huxley's defense of *Origin of Species***

For the past thirty or forty years, historians have been eager to point out that Huxley was not a fully committed Darwinian.<sup>2</sup> He was skeptical that evolution could be completely explained by a natural selection of similar individuals that would cause the gradual, local modification of a species; and in his view the resolvable and sensational debate over whether species had evolved was best kept apart from the more difficult question of cause.<sup>3</sup> Both problems had been fully discussed in *Origin of Species* but not fully settled. In addition to his consideration of Darwin's causal theory, therefore, Huxley sought to prove upon the basis of fossil evidence that evolution had occurred, which was a tenuous demonstration at the time and a distraction from Darwin's larger, causal argument. This contributed significantly to beginning the endless, unfortunate debates over whether fossil evidence proves Darwin. In fact, Huxley never fully endorsed Darwinism, and, although he thought he had demonstrated evolution

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<sup>2</sup> Lyons, op. cit. (Ch IV, note 1), pp. 245-53.

<sup>3</sup> Lyons, p. 231-53. Di Gregorio, op. cit. (Ch IV, note 1), p. 83-126. *LLTHH*, op. cit. (Ch IV, note 11), ii, p. 13.

from fossil evidence by 1876, Huxley remained reluctant to fully endorse natural selection for the rest of his life.<sup>4</sup>

Accepting evolution without fretting over Darwin's causal explanation meant that Huxley had little difficulty in refitting his pre-evolutionary morphological research onto an evolutionary framework: he needed only to reconsider organic types to be the consequence of genealogical as well as or instead of inherently morphological rules.<sup>5</sup> In fact, Huxley appeared to his biology students to be unconcerned for evolution and, when questioned on this, reasoned that evolution was a distraction from learning basic biological science.<sup>6</sup> The changes to Huxley's practical morphology that followed upon evolution were minimal in comparison to changes to his wider understanding of natural history.

There is no doubt that Huxley accepted evolution and contributed to evolutionary science. Nonetheless, only in disputes with religion did Huxley advocate evolution and, especially, Darwinism in their fullest ramifications. Michael Ruse has used this to argue that evolution to Huxley was primarily a matter of publicity against religion and not of science.<sup>7</sup> It is my present purpose, however, to discuss Huxley's Darwinian debates as a matter of natural theology,

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<sup>4</sup> *CE IV*, pp. 114-38. Lyons, pp. 170-77. Michael Ruse, "Thomas Henry Huxley and the Status of Evolution as Science," in Alan Barr, ed., *Thomas Henry Huxley's Place in Science and Letters* (Athens, GA : University of Georgia Press, 1997), pp. 140-58.

<sup>5</sup> Di Gregorio, op. cit. pp. 77-82.

<sup>6</sup> Ruse, "Status of Evolution," op. cit. at pp. 145-7.

<sup>7</sup> Ruse, at pp. 149-51. Di Gregorio, op. cit. pp. 187-92. For a different perspective, see Lyons, op. cit. pp. 231-78.

where the differences between scientific, religious, and public interests were often indefinite. When Huxley discussed Darwin's theory in scientific terms, he undoubtedly had natural theology in mind; and in dispute with religion, he had to score scientific as well as theological points. As was demonstrated in Chapter Three, discussing natural theology as a point of science with muted theological ramifications is consistent with trends that had been set prior to the publication of *Origin*. Huxley's concern was to fix Darwinism within this trend, not to manufacture a publicity stunt out of a scientifically dispensable theory.

This may be demonstrated by reading Huxley's several reviews, critiques, and defenses of Darwin and *Origin*. In his earliest public comments, Huxley treated Darwinism with perceptive clarity and, more remarkably, with considerable brevity. His more extensive concern was to provide readers with an understanding of Darwin's contribution to science or – if drawing a remote but perhaps helpful analogy may be permitted – to locate Darwin within the natural “historiography” of his day. He wanted to orient Darwin's public audiences to the scientific context of controversies in natural theology that they could generally be presumed to know something about, including the still simmering (or at least warm) debates over geological catastrophes and *Vestiges*. These were the public and controversial precedents that were most notoriously associated with Darwin's hypothesis, and Huxley's first move was to present them as matters of science that could be distinguished from the concerns of textual theology and traditional religion. In reading Huxley, however, we should bear in mind –

because Huxley was not interested in drawing our attention to it – that the distinction of science and natural theology from textual authority was not foreign to but, rather, characteristic of nineteenth-century natural theology.

In his anonymous 1859 Boxing Day review of “The Darwinian Hypothesis” in the *Times*, for example, Huxley abused persons who cited the authority of the Pentateuch in believing that the origin of living things was “the immediate product of a creative fiat and ... [therefore] out of the domain of science,” but he wrote more considerately of those who “profess to rest upon a scientific basis only ... [when they maintain] that every species was originally produced by a distinct creative act.” Although all of these persons held similar theological beliefs, only some of them had followed scientific thinking; and Huxley wanted to view as a matter of science the debatable conviction “that every species is ... incapable of modification,” a corollary of which was the affirmation of special creation. Huxley’s *Times* review included at least partially sympathetic examinations of what had been brought to the bar of evidential reasoning by Paley, catastrophism, and *Vestiges* in their different accounts of the creation and history of species. Quite apparently, therefore, Huxley’s contextualization of Darwin’s science was a review of past controversies in natural theology, although he never used that phrase; and he represented Darwin’s hypothesis as an answer to some of natural theology’s scientific deficiencies.<sup>8</sup>

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<sup>8</sup> *CE II*, pp. 1-21, especially 4-11.

Those deficiencies were most strongly stated in Huxley's essay "The Origin of Species" which appeared, again anonymously, in the April, 1860 edition of the "freethinking" *Westminster Review*, where he was a science editor.<sup>9</sup> This essay, befitting its forum, was Huxley's most ostentatiously anti-clerical representation of "Darwinism" (a term that appeared in print for the first time in its closing paragraph, denoting the promise of Darwin's hypothesis to be tested, revised, and refined by future science); and in it Huxley discharged his first great verbal barrages against religion, declaring that "the myths of Paganism are as dead as Osiris or Zeus ... but the coeval imaginations current among the rude inhabitants of Palestine ... have unfortunately not yet shared their fate," and that "Extinguished theologians lie about the cradle of every science as strangled snakes beside that of Hercules...."<sup>10</sup> However, attacks on theologians and traditional religion may not be identified as attacks upon natural theology. Huxley's treatment of the science of special creation was more respectful and, notably, a degree more circumspect.

Huxley's "The Origin of Species" is such a fine composition that it well masks the complexity of the issues it treats. One complex problem concerned the relations that pertained to science, religion, and natural theology; and Huxley's continued neglect of any explicit reference to "natural theology" compounded the difficulty of being clear about it. Closely following the language he had used in

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<sup>9</sup> *CE II*, pp. 22-79.

<sup>10</sup> *CE II*, pp. 51-2.

the *Times*, Huxley allowed once again that special creation and transmutation were rival hypotheses that “profess to stand upon a scientific basis.” In the *Westminster* review, however, he singularly challenged the profession of special creation upon the ground that it “owes its existence largely to the supposed necessity of making science accord with the Hebrew cosmogony; but it is curious to observe that, as the doctrine is at present maintained by men of science, it is as hopelessly inconsistent with the Hebrew view as any other hypothesis.”<sup>11</sup> The inconsistency, of course, lay in the fact that scientific special creationists understood special creation as an aspect of directed progress and not as a one-time event, apparently contradicting their intended agreement with scripture. Huxley’s claim was seemingly straightforward; and yet, in point of fact, it hopelessly confused every point that, in fairness to natural theologians, needed to be kept clear.

As Chapters Two and Three have demonstrated, the theological principle affirmed by special creation and theological superintendence was divine providence, not scriptural literalism. In fact, the reconciliation of scripture to natural history had been attempted by geological diluvialism, and it was diluvialism’s failure to reconcile Genesis to geology that had initiated controversy in the 1830s over the assertion that natural theology was a necessary premise to the affirmation of the moral authority of revelation. As the natural theologians understood it, special creation was a point of physical science that served to

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<sup>11</sup> *CE II*, p. 54.

demonstrate superintendental natural theology – the idea that God had discontinuously but designedly “directed” natural forces and natural history to desired ends – and superintendence, in turn, provided a rational foundation for the moral authority of special revelations that may have been given in civil history to an ancient people whose knowledge of the physical world would be antiquated by nineteenth-century standards. While affirming the moral authority of revelations, the point of special creation, in the hands of a superintendental natural theologian, was to spare physical science from engaging Genesis, not to make them agree. To refer special creation to biblical accordance in matters of physical science was to represent it as a theological failure – which, in 1860, it by no means was – and undermine the role of natural theology in religious debate. Undermining natural theology, of course, fit Huxley’s desire to separate science from religion. Whether by intention or in confusion, Huxley was misrepresenting the relation of natural theology to scripture by forcing special creation into an agreement with the “Hebrew cosmogony.”

Having dismissed special creation as a form of “Bibliolatry,” Huxley asked whether it “derive[d] any support from sound logic or science?” His summary answer was given directly: “Assuredly, not much.” However, the specifics provided by Huxley to tell against special creation are well worth our attention. He informed his readers that

The arguments brought forward in its favor are all of one form: ... we cannot understand the structure of animals or plants, unless we suppose that they were contrived for special ends.... But suppose we prefer to admit our ignorance rather than adopt an hypothesis

at variance with all the teachings of nature? Or, suppose for a moment that we admit the explanation, and then seriously ask ourselves how much the wiser are we; what does the explanation explain? Is it anything more than a grandiloquent way of announcing the fact that we really know nothing about the matter? A phenomenon is explained when it is shown to be a case of some general law of nature; but the supernatural interposition of the Creator can, by the nature of the case, exemplify no law, and if species really have arisen in this way, it is absurd to attempt to discuss their origin.<sup>12</sup>

It demands remark, however, that a special creationist and a superintendental natural theologian could have agreed with most of this, with the certain exception of the variance that Huxley asserted between special creation and “all the teachings of nature.” If the paleontological record as well as utilitarian design arguments proved special creation, as the superintendentalists claimed, then special creation would have been one of nature’s teachings, not a contradiction. This raised questions over what was acceptable as “sound logic,” “science,” and “the teachings of nature” – an interesting problem to find implicit within the early thought of the future creator of the neologism “scientific Naturalism.”<sup>13</sup>

The other objections to special creation that had been raised by Huxley involved the boundaries of natural theology and science. The superintendentalists – as exemplified by Whewell and discussed in previous chapters – would no more than Huxley have accepted supernatural interposition as a physical explanation in the sciences; their objection was to the presumption

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<sup>12</sup> *CE II*, 55-57.

<sup>13</sup> Lightman, Bernard “Fighting Even with Death”: Balfour, Scientific Naturalism, and Thomas Henry Huxley’s Final Battle,” in ed. Alan Barr, *Thomas Henry Huxley’s Place in Science and Letters* (Athens, GA : University of Georgia Press, 1997), pp. 323-50 at p. 338. *CE V*, p. 38.



that all of natural history had its explanation in physics. What was “absurd” to the superintendentalists was not the attempt to find a physical, uniform, or “scientific” explanation for the origin of species, but the presumption that a physical or uniform explanation must be available. Additionally, Huxley’s expressed preference for ignorance over utilitarian design as an explanation of organic form is a good instance of his practical determination – discussed in Chapter Four in relation to Paley, Cuvier, and von Baer – to ignore the explanations of natural phenomena offered by natural theologians and, even more remarkably, to ignore the very problems in natural history that natural theology sought to explain. In his efforts to distinguish science from religion, Huxley often found ignorance preferable to natural theology.

In the passage being considered, in fact, Huxley has been very unclear about what kind of “explanation” he is wanting as well as its relation to a deliberately maintained ignorance (which is an interesting gap in the thought of the future creator of the neologism “agnosticism”). Utilitarian natural theology never pretended to explain organic form in terms of “some general law of nature,” which is the standard Huxley devised for it. Huxley insisted that “it is obviously necessary that we should know all the consequences [of natural causation] continued through unlimited time” before “any amount of evidence which the nature of our faculties permits us to attain” could justify the “miserable presumption” of a supernatural cause, still without clarifying what sort of explanation he was considering. If he meant before admitting the end of physical

science, then, of course, he would be right. However, Huxley also would describe special creation as marking “the youth and imperfection” of biology in a way comparable to “When astronomy was young ... and the planets were guided in their courses by celestial hands,” a claim which seemingly admits supernatural causation as a preliminary rather than entirely miserable presumption when it premised rather than ended the study of physical order in nature.<sup>14</sup> This returned Huxley to the need to be clear and definite about the relation of science to design argument and natural theology. After all, the superintendentalists would be wondering, if supernaturalism were justified in premising the (perhaps distinguishable) orders of the cosmic and solar systems, why should it not be justified in premising the (possibly separate) origins of the organic and moral orders of nature, as well as the origins of different eras in the earth’s history that did not seem, from paleontological and geological evidence, to have followed one from another upon only physical principles? Whewell, after all, had proposed supernatural causation, under the rubrics of superintendental design argument, not as the end of physical science, but as a rational complement that might explain the general direction of natural history where that direction may be inexplicable upon only physical principles.

Of course, it was the possibility that theological rather than merely physical principles may be needed to explain natural history that Huxley had consistently refused, not only to admit, but to discuss. In the process of

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<sup>14</sup> *CE II*, p.58.

introducing his readers to the scientific context of Darwin's hypothesis, Huxley reduced special creation to the equivalent of supernatural disruptions to the physical order. However, the natural theology of Huxley's day was not thinking of special creation as the illogical disruption, but as the superintended direction of physical processes. Huxley could not fairly discuss natural theology in terms only of supernatural disruption; and, in fact, he did not speak explicitly of natural theology at all in "The Origin of Species," his first strongly anticlerical essay.

This does not mean, of course, that Huxley was confused or was being overly misleading about the basic impact of Darwin's theory upon the most ordinary points of natural theology. He was, in fact, capable of making that impact felt in precise, dramatic, and emphatic terms. For example, a point in Darwin's argument that frequently misled readers was the analogy of natural selection to the selective breeding of pigeon varieties. Since selectively breeding varieties is an intentional process, readers often imagined an intentional agent behind natural selection, as well. As Huxley put the problem, "Where in nature was the analogue of the breeder to be found? How could that operation of selection, which is his essential function, be carried out by mere natural agencies?" Already in 1859, however, Huxley made a succinct and disturbing reply: in Darwin's theory, "That which takes the place of the breeder and selector in nature is Death."<sup>15</sup> The suggestion that God in special creation would be displaced by inscrutable, inevitable, and paradigmatically natural "Death" was

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<sup>15</sup> Huxley, "Time and Life," op. cit. (Ch IV, note 12), pp. 142-8 at 147. See also *CE II*, pp. 16-17.

what Darwin, especially in Huxley's hands, brought to the relation of science to religion. Whether or not it was possible to see evolution and natural selection as part of God's design, the relation of creation and the "progress" of life to divine beneficence would never be the same. If forms of life were designed, they were designed to die.

Although he never went as far as the American theologian Charles Hodge in positively declaring that Darwinism "is Atheism,"<sup>16</sup> Huxley was always clear and careful in protecting Darwin's theory from being misconstrued in ways that suggested the confirmation of traditional religion. However, in moderation of Ruse's suggestion that Huxley did not value Darwin as highly in the scientific as in the public and religious sphere, Huxley did not need to be discussing Darwinism to the benefit of the general public in order to differentiate it from natural theology. He could do so in scientific essays that had no overt public or religious significance.

For example, Huxley's essay "Criticisms on 'The Origin of Species'" appeared in *The Natural History Review* in 1864.<sup>17</sup> It defended Darwin from the two "most elaborate" scientific criticisms that had been published against the *Origin*, one written by a German and the other by a French natural philosopher. The Frenchman – "M. Flourens, Perpetual Secretary of the French Academy of Sciences" – had published a ludicrous critique that afforded Huxley an

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<sup>16</sup> Hodge, *What is Darwinism?* op. cit. (Ch I, note 34), p. 156.

<sup>17</sup> *CE II*, pp. 80-106.

opportunity to ridicule a naturalist that "cannot imagine an unconscious selection" and, therefore, believes that "Mr. Darwin's great error is that [the idea of natural selection] has personified nature" and that Darwin "plays with Nature ... and makes her do all he pleases." Additionally, Flourens defended special creation by denying embryological development and insisting that completely-formed individuals merely grew or enlarged during gestation, which was an impossible view by 1864. Huxley's unkind remarks upon such ideas demonstrate that he was not less willing or able to savage a man of science than a theologian when he believed he had been provided a justifiable opportunity.<sup>18</sup>

The German critique, written by "Professor Kölliker, the well-known anatomist and histologist of Würzburg," mistook Darwin not as having personified nature but as being, "in the fullest sense of the word, a Teleologist" and for having said, as Kölliker thought, "that every particular in the structure of an animal has been created for its benefit...." In Kölliker's interpretation, Darwinian evolution presumed the "tendency of organisms to give rise to useful varieties" as well as "the imperfection of organisms and the necessity of their being perfected ... because Darwin could think of no other principle to explain the metamorphoses which ... have occurred." Professor Kölliker thought he was contradicting Darwin by asserting that "Varieties arise irrespective of the notion of purpose, or of utility, according to the general laws of nature, and may be either useful, or hurtful, or indifferent." Huxley remarked upon the

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<sup>18</sup> *CE II*, 97-106.

misunderstanding that "It is singular how differently one and the same book will impress different minds." Very differently, indeed, from Kölliker, Huxley had been struck "most forcibly ... [by] the conviction that Teleology, as commonly understood, had received its deathblow at Mr. Darwin's hands," and Huxley claimed, as well, that "nothing can be more entirely and absolutely opposed to Teleology, as it is commonly understood, than the Darwinian Theory." Huxley then provided a more accurate surmise of Darwin's theory and countered Kölliker's misunderstandings one by one with quotes from *Origin of Species*.<sup>19</sup>

Huxley wrote this essay in critique of two of Darwin's European critics for the benefit of primarily British natural historians, and it reflects his intentions toward the latter. Views such as those of Flourens that might persist in Britain were being threatened with public ridicule; but Kölliker's views reflected widespread confusion among respected men of science whom Darwin's transitory use of teleological concepts and language had fooled into considering Darwinism a style of teleology. Huxley had to correct this misunderstanding because, as he said, "of its great general importance" – the only (and oblique) reference in the essay to teleology's theological implications.<sup>20</sup> Along with the absence of theology, however, Huxley's discussion of teleology in philosophical and scientific terms was simple and direct. He did not hesitate to present "Paley's famous illustration ... of all the parts of a watch" in explaining the meaning of teleology

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<sup>19</sup> *CE II*, pp. 80-97, especially at 82-6.

<sup>20</sup> *CE II*, p. 88.

as “commonly understood;” and, in contrast to what he had said in the *Times* and the *Westminster Review*, Huxley’s presentation of Paley in the *Natural History Review* had no hint of sarcasm or suggestion of religious bias.<sup>21</sup> In a very interesting passage, Huxley even allowed that Darwin

had rendered a most remarkable service to philosophical thought by enabling the student of nature to recognize, to their fullest extent, those adaptations to purpose which are so striking in the organic world, and which Teleology has done good service in keeping before our minds, without being false to the fundamental principles of a scientific conception of the universe. The apparently divergent teachings of the Teleologist and of the Morphologist are reconciled by the Darwinian hypothesis.<sup>22</sup>

In addition to the apparent acceptance of teleology as “philosophical,” it requires a very careful reader to resist Huxley’s grammatically dubious suggestion that teleology was true to a scientific conception of the universe; and it is also wonderful to ask whether Huxley saw himself as a “student of nature” who might have benefited more than he had from the “good service” of teleology in remembering how “striking” were the adaptations of the organic world. Huxley, after all, had been content to remain ignorant of adaptation.

“Criticisms on ‘The Origin of Species’” enables historians to reach one important conclusion: Darwin had brought Huxley into open, extended, considerate, and scientific discussion of the concepts and terms of natural theological debate. Huxley could not defend Darwin from teleological misunderstanding by men of science in Britain without paying respects to

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<sup>21</sup> *CE II*, pp. 82-6.

<sup>22</sup> *CE II*, p. 86.

teleology as a matter of science; and this was something he had previously and studiously refused to do. Nonetheless, Huxley's consideration of natural theology as a part of his defense of *Origin of Species* was limited to a discussion of concepts – he never proposed it for topical discussion. Additionally, Huxley dealt more considerately with theology when he treated its concepts in strictly scientific and philosophic terms; in his defense of Darwin in other respects, Huxley's anticlerical bias showed as the association of "special creation" and, implicitly, natural theology with "Bibliolotry" and religious bias.

It is not enough, then, to read Huxley's declamations upon the pernicious effects of religion in science, his categorization of special creation and utilitarian design as immature science, and his insistence that *Origin of Species* was a deathblow to teleology "as it is commonly understood," as if these were simple statements about the impact of Darwin's book upon the arguments of natural theology. They were, in fact, Huxley's belated and highly indirect admission that natural theology held, or at least had held, a conceptually important place in the logic and explanations of modern natural philosophy and natural history. Because he had to discuss natural theology as a part of the conceptual background that readers must bring to an understanding of Darwin, Huxley emphasized the clear opposition of Darwinism to the "common" natural theology of utilitarian design and special creation. To Huxley this meant emphasizing, firstly, that there was very little of traditionally religious components in Darwin's thinking, and, secondly, that Darwin had an entirely natural and uniform explanation for the



origin of species. However, Huxley was not being forthright in choosing to illustrate natural theology in 1859 by the examples of Paley, clockworks, and special creations. Questioned more directly and expressly, we must ask, What had Huxley glossed by his qualification of teleology “as it is commonly understood” and in its “ordinary sense”? What had he to say about Darwin’s relation to teleological arguments that were not premised upon utilitarian design and special creation?

### **Natural theology and the meaning of “Darwinian” evolution in Huxley’s defense of *Origin of Species***

Those questions become difficult to answer because, in his defense of *Origin*, Huxley was speaking on behalf of but not necessarily as would Darwin. Moreover, the problem, especially in relation to natural theology, extends well beyond an analysis of Darwin and Huxley. Bowler, for example, has argued that evolution in the nineteenth century was a “non-Darwinian revolution” in the history of science.<sup>23</sup> His point was that Darwin’s ideas were received within a generally “developmental” understanding of evolution that had existed before and continued to exist after the publication of *Origin of Species*. Although Darwin believed that species evolved according to a process of external selection from among individuals of the species, pre-Darwinian thought had generally accepted evolution as the equivalent of “development,” an idea taken from embryology and referring always to its embryological origin to some degree. Embryological

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<sup>23</sup> Bowler, *Non-Darwinian*, op. cit. (Ch II, note 1).

development, of course, is organically inherent and is not a selective process.<sup>24</sup> Notably, also, embryological development is generally considered to be linear: an embryo develops a certain way, and, theoretically, if you repeated the process, then it would develop the same way unless differently affected by "external conditions." Moreover, if you were to reverse the process, then the adult would presumably revert to the identical embryo it had once been. Darwinian evolution, by contrast, is non-linear because its principal mechanical component, the natural selection of individuals from among a special population, is chanceful and contingent. To realize how little the nineteenth century appreciated this fact, you need only ask yourself how aware the Victorians were that, were the natural history of the earth made to repeat itself purely upon Darwin's terms, any "progress" toward "man" would be unnecessary.

Huxley is susceptible to the charge of having been non-Darwinian because he thought of evolution in patently linear terms. Here, the term "linear" is preferred to Bowler's preference for development because Huxley did not reserve the idea of evolution only to natural processes that were strictly analogous to embryological development, despite (or, perhaps, because of) the fact that Huxley was expert in developmental embryology. Huxley referred, for example, to the possible evolution of "the cosmic vapour" into solar systems in terms that were not organic but merely atomistic; and he seemed to be implying that the evolution of fauna may have differed in no obvious way. In this respect, what

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<sup>24</sup> However, Huxley considered it "a probable hypothesis" that a molecular struggle for existence may take place within organisms. *CE II*, p. 115.

mattered about evolution to Huxley was linearity and material determinism; he was not much constrained by the connotations of embryological development, such as growth and the gradual, progressive formation of inherent characteristics.<sup>25</sup>

Huxley represented Darwin as a newcomer to the train of developmental thought already tracked by the organic natural philosophies of Lamarck, Geoffrey, and *Vestiges*.<sup>26</sup> However, Huxley was keenly aware that Darwin was categorically distinguished from these predecessors by having proposed a credible mechanism in explanation of transmutation. Indeed, that was the point upon which Huxley corrected even Lyell's mistaken equation of Darwin's theory with Lamarck's views.<sup>27</sup> Moreover, as was noted under the previous subheading, Huxley had a good conceptual grasp of Darwin's evolutionary mechanism. It is worth considering that this may qualify Huxley as a conceptual Darwinian, whether or not he adequately understood that Darwin had not derived transmutation and evolution from the concepts of development. It was, after all, much more straightforwardly as an advocate of development that Alfred Russel Wallace had independently formulated the mechanics of "Darwinism" in 1858.<sup>28</sup>

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<sup>25</sup> *CE II*, p. 110.

<sup>26</sup> *CE II*, pp. 13-14, 63-71.

<sup>27</sup> Lyons, op. cit. pp. 106-07.

<sup>28</sup> Wallace, Alfred Russel. "On the Tendency of Varieties to Depart Indefinitely From the Original Type" (1858).

Although it is tautological to say that Huxley's qualifications as a Darwinian depend upon what is meant by Darwinism, there is a historiographical point to be made. Bowler's insistence that Darwinism means what Darwin meant smacks of Whiggish historiography: in an effort to correct a misrepresentation of the significance of Darwin in the history of nineteenth-century biological science, Bowler discovered a way to emphasize evolution's "non-Darwinian" aspects. Nonetheless, it is doubtful that Darwinism may be adequately defined by Darwin's particular view. It may be a ground for objection, for example, that someone as significant as Wallace, who differed from Darwin in important respects, such as by rejecting sexual selection and by arguing more tenaciously than Darwin for the complete efficacy of natural selection, could claim that it was his "differences from some of Darwin's views" that made him "the advocate of pure Darwinism."<sup>29</sup>

My particular ground for objection, however, is that restricting Darwinism to Darwin's ideas requires historians to accept as definitive what could not have been known at the time: that Darwin would prove largely correct in his understanding of the irregularity of organic variation. Darwin thought of variation in a pronouncedly non-linear or "random" fashion because he sought to protect the importance of natural selection as the determinate factor in the evolution of organic form. In a famous metaphor, Darwin explained that the laws of variation

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<sup>29</sup> Wallace, Alfred Russel. *Darwinism: an exposition of the theory of natural selection with some of its applications*, second edition (London and New York : Macmillan, 1889), from the preface to the first edition.

may determine the form of individual variations analogously to how the laws of physics determine the shapes of stones that may fall from a cliff or precipice.<sup>30</sup> Although the shapes of the fallen stones will in a general sense be determined according to the laws of physics, physics is not usefully predictive of any stone's particular shape. In the same way, Darwin thought, the "laws of variation" were not usefully predictive of the organic alternatives that would be available to a natural selection.

However, Darwin was far from carrying the day upon this point; and the historiographical question, then, is this: had the laws of variation been proved somewhat more determinative of organic form than they were in Darwin's mind, would variation and natural selection no longer have been considered to be "Darwinism?" I doubt it; and although it is not my purpose to pose that question here, it is important to note that Huxley, at least, considered investigation into the laws of variation to be a significant problem within Darwinian science without expressing concern over the degree to which those laws would prove to be formally determinate.<sup>31</sup> In fact, Huxley's predilection for platonic rather than utilitarian morphology would suggest a preference for a degree of formal determinism within the rules of variation considered apart from natural selection.<sup>32</sup>

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<sup>30</sup> Darwin, Charles. *The Variation of Animals and Plants under Domestication*, two volumes (London : John Murray, 1868), ii, p. 430-1.

<sup>31</sup> *CE II*, pp. v-vi, 33-34, 114-16, 222-223.

<sup>32</sup> Di Gregorio, op. cit. pp. 114-120.

In Huxley's mind, then, accepting Darwin's particular view on variation was not a point of adjudication between Darwinian and non-Darwinian evolution. There were ways in which variation could proceed in a more orderly or formal fashion (as if mere physics broke falling stone into shapely fragments) than Darwin believed while keeping variation within the conceptual landscape of Darwinism as Huxley accepted it. It is crucial to bear this in mind, because it defines a way in which Darwinian evolution, even as the anti-clerical Huxley understood it, could serve as a form of natural theology. If the laws of variation seemed more favorable to evolutionary success than the laws of physics were favorable to sculpting falling stones, then there remained senses in which variation may have been "intended" for a general evolutionary use without involving the further claim that actual variations were ever designed for a specific use. A form of design argument, in other words, may have resided within the very mechanism of Darwinian evolution as Huxley was open to receiving it.

There was an obvious way, then, in which any variation could be considered "random" in relation to its biological utility without meaning that the laws of variation were not, in another sense, constructive of evolved organic form. Huxley certainly noticed this. An example may be made of Kölliker, who, as noted above, had claimed that "Varieties arise irrespective of the notion of purpose, or of utility, according to the general laws of nature, and may be either useful, or hurtful, or indifferent." Kölliker also denied that nature displayed any tendency "to give rise to useful varieties," and Huxley had affirmed these

comments while correcting Kölliker's mistaken belief that they were a contradiction of Darwin. Of course, by denying the tendency toward useful varieties, Kölliker was only denying that variations were introduced into nature as if they were intended for some specific use. He still believed that the laws of variation, whatever they were, were part of a universal "plan" and "harmony" that shaped the natural world, organic and inorganic. Huxley quoted Kölliker as saying that

The developmental theory of Darwin is not needed to enable us to understand the regular harmonious progress of the complete series of organic forms from the simpler to the more perfect.

The existence of general laws of Nature explains this harmony, even if we assume that all beings have arisen separately and independent of one another. Darwin forgets that inorganic nature, in which there can be no thought of genetic connexion of forms, exhibits the same regular plan, the same harmony, as the organic world; and that, to cite only one example, there is as much a natural system of minerals as of plants and animals.<sup>33</sup>

Evidently, Kölliker thought that serial special creations could still be affirmed against Darwin and without any appeal to the argument for specific utilitarian design. However, the immediate point is that a natural philosophy, such as Kölliker's, that understood order and harmony in nature to be the gradual realization of a general plan that included a series of specific organic beings that were adapted to survival in nature, may be represented as a rejection of natural theology all too easily. All it took was for Huxley to reiterate Kölliker's belief that the general laws of nature could readily dispense with utilitarian design in

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<sup>33</sup> *CE II*, p. 92.

providing a quasi-evolutionary explanation of natural history's "harmonious progress ... of organic forms...." Dispensing with utilitarian design, in other words, may be highlighted in a way that makes Kölliker's science appear much less a natural theology than it was. Huxley, of course, had already exploited this kind of conceptual shell game, in which the concept of design is constantly shunted aside so that it may never be pointed out, when he separated the science of general morphology from the natural theologies of Paley, Cuvier, and the German idealists, as discussed in Chapter Four.

Nonetheless, if Darwin were going to be really useful to liberating science from religion, then Huxley would need to show that Darwinism could not be neglected as the best explanation for the "progress" of life as easily as Kölliker had claimed; and, in fact, Huxley's defense of *Origin* contained a demonstration of why Darwinism was necessary to an explanation of organic form. Against Kölliker, Huxley noted that to claim that natural laws explained the natural order did not go very far toward describing the precise natural laws that may explain a particular order of nature. Kölliker had very weakly suggested, therefore, that non-genetic explanations of the inorganic world may lead us to expect non-genetic explanations of organisms, as well. The need for Darwinism, Huxley noted, resided in the difficulty of explaining biological particulars such as "the stripes of dun horses, and the teeth of the foetal [Bowhead whale]." These



perplexing natural phenomena were understandable as the genetic vestiges of once-useful adaptations but were very difficult to explain in any other way.<sup>34</sup>

What is more remarkable, however, is that Huxley took advantage of Kölliker's simplicity in order to press Darwinism deeply into non-organic nature. Reversing Kölliker's suggestion of a non-genetic explanation of organic form, Huxley suggested genetic explanations of inorganic form. He asked Kölliker,

...is it quite so certain that a genetic relation may not underlie the classification of minerals? The inorganic world has not always been what we see it. It has certainly had its metamorphoses, and, very probably, a long [history of development] out of a nebular blastema. Who knows how far that amount of likeness among sets of minerals, in virtue of which they are now grouped into families and orders, may not be the expression of the common conditions to which that particular patch of nebulous fog, which may have been constituted by their atoms, and of which they may be, in the strictest sense, the descendants, was subjected?<sup>35</sup>

This passage is remarkable for the way it mixes the organic metaphor of a blastema with the physical metaphor of a fog in its description of a genetic mineralogy. It may be fairly asked in what sense a blastema and a fog both may be thought to have genetic descendents.<sup>36</sup>

Oddly enough, the question has a definitive answer, at least, if it were asked of Huxley in 1869, when he wrote in a famous passage that nature displays

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<sup>34</sup> *CE II*, pp. 92-3.

<sup>35</sup> *CE II*, pp. 93-4.

<sup>36</sup> "Genetics" is meant in the broad sense of inheriting form, or shaped by the process of inherent becoming, rather than containing a reference to "genes" (a term coined in 1913).

a wider Teleology, which is not touched by the doctrine of Evolution, but is actually based upon the fundamental proposition of Evolution. That proposition is, that the whole world, living and not living, is the result of the mutual interaction, according to definite laws, of the forces possessed by the molecules of which the primitive nebulosity of the universe was composed. If this be true, it is no less certain that the existing world lay, potentially, in the cosmic vapour; and that a sufficient intelligence could, from a knowledge of the properties of the molecules of that vapour, have predicted, say the state of the Fauna of Britain in 1869, with as much certainty as one can say what will happen to the vapour of the breath in a cold winter's day.<sup>37</sup>

Organic and inorganic descendent forms are alike in that they share a wider teleological cause. In Huxley's view, mechanical principles that may explain the dispersal of the molecules of a breath may also explain, given sufficient intelligence and knowledge of the properties of matter, the molecular arrangement of a very definite group of genetically descended organisms. All that Huxley required to make good his teleological claim was for inorganic matter, under the conditions of an initial nebulosity, to possess the property of becoming genetically transmutable life (in all its forms) and, also, for evolution, in its non-genetic as well as its genetic senses, to be perfectly linear and predictable. More breathtaking than a cold winter's day, when juxtaposed this way, was Huxley's willingness to upbraid Kölliker for having forgotten that the particulars of nature need explaining, although, in pursuing another point, Huxley would contentedly overlooked any possible doubts that material laws prescribed absolutely determinate forms of organic and inorganic evolution.

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<sup>37</sup> *CE II*, p. 110.

This was not a blind spot in Huxley's thinking. It was a rhetorical strategy, of course. Placed unobtrusively between Huxley's careful defense of Darwinism's explanatory power and his ready advocacy of genetic explanations for even inorganic evolution, Huxley had located Kölliker's fairly traditional natural theology. This natural theology was never designated as such by Huxley but was clearly implied by Kölliker's misinterpretation and criticism of Darwin's theory; and, upon that slight reference to natural theology, Huxley discovered a willingness to swing from scientific diligence to rhetorical flourish. Proximity to Darwin's wonderful explanation of a horse's stripes and a whale's fetal teeth allowed Huxley to imply that a similar explanatory rigor may exist within a presumed material determinism so wide that it reduced the possibilities for teleology and design to a set of material properties and initial conditions pertaining to a cosmic nebula – or a blastema, as the case may be.

It is remarkable that Huxley's defense of *Origin of Species* was not always about the explanations of science, and neither was it always about religion. He was also concerned to gain control of natural theology's basic explanation of natural history or, in other words, to take control of design arguments. Within Darwinism as Huxley accepted it – allowing for the possibility that the laws of variation may supplement natural selection in determining organic form – there were many possibilities for design argument that could not be easily stamped out. These possibilities will be examined in greater detail next chapter. Certainly, however, they involved difficult questions about whether variation and natural

selection could completely explain organic form, whether the laws of variation independently helped “shape” organisms, and whether there were any absolute distinctions between merely physical being and the existent forms of organic being. In what I consider is fairly called a shell game, Huxley had shunted these questions and possibilities collectively under the teleological category of material determinism, and then allowed his readers to believe that, to all appearances, design was nowhere else to be found in the processes of evolution. This was an expert performance; and the point of it, of course, was to make design, if it existed in nature, into a concern of physical science stricken from the domain of natural theology and religion.

Huxley, however, was by no means the Darwinian man of science most capable of discussing the detailed application of Darwin’s theory. There were others, such as Wallace and the American botanist Asa Gray, who understood much better than Huxley whether Darwin had explained everything from a dun horse’s stripes to a Bowhead whale’s fetal teeth and, ultimately, the evolution of human being. The estimations of Darwinism’s explanatory power that were given by Gray and Wallace, two major Darwinian natural philosophers and also natural theologians, are the topic for Chapter Six.

## CHAPTER VI:

### DARWINIAN NATURAL THEOLOGY, 1860-1876



**Asa Gray**



**Alfred Russel Wallace**

The previous chapter noted that Huxley, although he advocated Darwinism and rejected utilitarian design in explanation of organic form, may be considered a part of nineteenth-century teleological thought because he understood evolution developmentally and linearly. The fundamental proposition of evolution was, Huxley had stated, "that the whole world ... lay, potentially, in the cosmic vapour; and ... a sufficient intelligence could, from a knowledge of the properties of the molecules of that vapour, have predicted, say the state of the Fauna of Britain in 1869, with as much certainty as one can say what will happen to the vapour of the breath in a cold winter's day."<sup>1</sup> This remarkable

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<sup>1</sup> See Ch V, note 37.

statement reflected Huxley's philosophical material determinism and gave his teleological perspective so wide a provenance as to suit almost any mechanical explanation for evolution that might be offered. Huxley knew, nonetheless, that the only scientifically respectable proposal to explain special evolution was Darwin's theory: the natural selection of inheritable variations exhibited by the individuals of a specific population. Today, certainly, Darwinian evolution is understood to be a much more random (or, more precisely, non-linear) process than would allow for the prediction of specific fauna from knowledge of "nebulosity." Had Huxley misrepresented Darwin's ideas by proposing mechanical linearity as their fundamental principle? How may this question bear upon a consideration of Darwinism's place in the history of nineteenth-century natural theology?

Although Huxley may be broadly categorized as Darwinian because he accepted evolution and believed that variation and natural selection were its probable cause, he was by no means a practitioner of Darwinian science. In his practical work, Huxley's efforts to demonstrate lines of evolutionary descent from fossil evidence superseded any concern for evolution's causes; and, working primarily as a morphologist, he was too little interested in the niceties of biological adaptation to contribute much to their explanation. Moreover, in Huxley's view Darwinism allowed for the possibility that the laws of genetic variation may have been more determinative of organic form than Darwin would admit. It would not be (and has never been) instructive, therefore, to focus too

tightly upon Darwin and his “bulldog,” Huxley, in discerning the relation of Darwinism to teleology and natural theology. Fortunately, in addition to Darwin’s unteleological variations and Huxley’s teleological mechanical determinism, there were other views that were equally “Darwinian” and are equally as important for understanding the relation of Darwinism to natural theology. In fact, the two men who may most nearly have rivaled Darwin in their understanding of Darwinism – Gray and Wallace – separately argued for natural theology, or at least a design argument, as a consequence of, and not despite, Darwinian science.

Asa Gray (1810-1888) was born in Sauquoit, New York. He earned an M.D. in 1831 from the College of Physicians and Surgeons in Fairfield but preferred the study of botany to the practice of medicine. Like Buckland, Sedgwick, and Whewell among the major figures of this dissertation, Gray was an academic natural theologian: he was a professor of natural history at Harvard from 1842 to 1873 and is generally regarded as the most significant American botanist of the nineteenth century, especially because of his contributions to taxonomy. Through a long and cordial correspondence, Gray proved very helpful to Darwin in researching *Origin of Species*. Following the publication of *Origin*, he was Darwin’s staunchest American supporter in questions of science and, perhaps with less warrant, his foremost theological interpreter. Gray’s concern for the theological importance of Darwin’s theory followed from a long commitment to Protestant evangelical faith and was manifested in

correspondence even before the *Origin* was published. In 1860, Darwin wrote that "No one person understands my views and has defended them so well as A. Gray; -- though he does not by any means go all the way with me."<sup>2</sup> Gray's efforts as a botanical collector and donor were basic to the creation of Harvard's department of botany, and the university's renowned Gray Herbarium is named after him. Gray's attempts to relate Darwinism to Christian orthodoxy became a part of his immense scientific reputation through the publication of such works as *Darwiniana* (1876) and his lectures on *Natural Science and Religion* (1882).

The professional life of Alfred Russel Wallace (1823-1913) is much more difficult to characterize. He was an Englishman born in the Welsh village of Usk, Monmouthshire (now Gwent). His father's financial instabilities saw Wallace apprenticed as a surveyor by 1837 and, for a decade after, Wallace made a tenuous and somewhat transient living by means of his surveying skills. His lifelong interest in radical politics dates from this time. His private expeditions as a naturalist to the Amazon rainforest (1848-1852) and, more significantly, the Malaysian archipelago (1854-1862) were intended partly as business ventures to be made profitable from the sale of specimens. In 1858, his paper "On the Tendency of Varieties to Depart Indefinitely from the Original Type" was sent from the jungles of Malaysia to Darwin in England, setting in motion a series of events that would make Wallace famous as the co-originator of the theory of natural selection. In the late 1860s Wallace became – and for the rest of his life

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<sup>2</sup> Darwin, Charles. *The Correspondence of Charles Darwin*, ed. Francis Darwin (New York : D. Appleton and Company, 1903), volume 8 (1860), p. 303.



remained – a public advocate for the scientific evidence in favor of spiritual phenomena and, no less, an expounder of spiritualist philosophy. Starting in 1870, he took an interest in the nationalization of Church lands (as well as in other social issues) and, from 1880 until his death, presided over the Land Nationalization Society. Late in life, he acknowledged that he was – and probably always had been – a socialist. Throughout these years, his work as a naturalist continued to be significant. In stark contrast to Huxley, however – and, in part, as a consequence of his radical views – Wallace believed that science’s true interests were best served by keeping science independent of government support.<sup>3</sup>

Wallace’s status as the co-originator of the theory of natural selection calls for particular mention. Although, as Cannon and Ospovat have shown, Darwin arrived at his evolutionary theory in ways largely reworked from the concepts of utilitarian design, Wallace quite differently became a serious student of natural history only after being convinced of transmutation by reading *Vestiges*. His expedition to the Amazon, for example, was partly undertaken in the hope of discovering a theory of transmutation. It was not for another ten years, however, that, while sick with malaria in Borneo, he hit upon a conceptual solution to the problem of originating species: the “survival of the fittest” of naturally occurring

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<sup>3</sup> Two recent biographies of Wallace are Michael Shermer, *In Darwin’s Shadow: the life and science of Alfred Russel Wallace* (Oxford : Oxford University Press, 2002) and Ross A. Sloten, *The Heretic in Darwin’s Court: the life of Alfred Russel Wallace* (New York : Columbia University Press, 2004).

varieties.<sup>4</sup> In stark contrast to Darwin's decades of painstaking research, Wallace immediately prepared a theoretical essay and sent it, unwittingly, to Darwin, of all people, for review. Darwin found in the essay a remarkable abstract of his own more advanced work, exclaiming that "Even his terms now stand as heads to my chapters!"<sup>5</sup> A delicate question of priority was resolved when Darwin was advised by friends to prepare an essay for joint presentation with Wallace's to the *Linnean Society of London* on July 1, 1858. Informed of this arrangement after the fact, Wallace would publicly profess gratitude for the rest of his life for having been admitted into a share of the discovery of natural selection and then spared a defense of the hypothesis.<sup>6</sup> Darwin prepared *Origin of Species* for publication the following year.

This chapter will contrast the evolutionary views of Gray and Wallace to Huxley's determinism in order to show the teleological range of Darwinian scientific thought. It will also combine the technical (intellectual) and social histories of natural theology and Darwinian science to substantiate the claim that natural theology reached its theological term as an aspect of nineteenth-century Darwinian science – the thesis of my dissertation. The criticisms of anti-Darwinian evolutionists – such as Argyll, St. George Mivart, George Romanes,

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<sup>4</sup> The phrase "survival of the fittest" was coined by the philosopher Herbert Spencer; but Wallace advocated its use in preference to Darwin's "natural selection."

<sup>5</sup> Darwin, Charles. *The Life and Letters of Charles Darwin*, ed. Francis Darwin, three volumes (London : John Murray, 1887) ii, p. 116-117.

<sup>6</sup> Wallace, Alfred Russel. *Contributions to the Theory of Natural Selection*, second edition (New York : Macmillan and Co., 1871; 1870), pp. iv-v.

and Samuel Butler – whose views also had explicit theological importance, are largely omitted from this consideration in order to demonstrate that Darwinism, even in the hands and minds of its advocates, did not resolve but enlarged the increasingly inconclusive debates between developmental and superintendential natural theology – debates that had also characterized pre-Darwinian thought. Nonetheless, natural theology in the 1860s and -70s would all but lose its public appeal as a basis for the comprehension of science by Anglican – or, in the case of the American, Gray, generally Christian – theology for reasons that included the professionalization of science, the technical difficulty of the science and the design arguments, the reading public’s increasing expectation that science would be presented without a religious gloss, and the religious controversy over evolution’s acceptability to Christian faith. In regard to this loss, it should be remembered, from Chapter Two, that it was never the primary role of scientifically grounded nineteenth-century natural theology in Britain to reconcile science to religion, but to publicly secure the liberal Anglican comprehension of science by making theology more scientific and less textual and traditional. It may be noted, additionally, that there were similar debates in the United States over the means to the incorporation of science within public and religious institutions – for example, into colleges and universities.<sup>7</sup> It is not necessary, then, to find a fundamental incompatibility between natural theology and Darwinian science in order to account for natural theology’s loss of public note

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<sup>7</sup> A helpful if somewhat dated study is Herbert Hovenkamp, *Science and Religion in American, 1800-1860* (Philadelphia : University of Pennsylvania Press, 1978).

within the Darwinian era: a general loss of interest in making theology scientific would suffice.<sup>8</sup> This is remarked and not studied here. It is important to bear in mind, however, that it is consistent with nineteenth-century British and, in all likelihood, American history that natural theology should vanish, not from within what may be broadly considered scientific and Darwinian thought, but from within professional science, Christian theology, and general public discourse.

### **Asa Gray and Darwinian natural theology**

As we saw in Chapter Four, Huxley's defense of Darwin had been concerned to abstract the scientific importance of *Origin of Species* from a prior history of controversy over "the species question" in natural theology and, at the same time, to prevent Darwin's being misconstrued as a teleologist in any "ordinary sense" of the word. Although it had been relatively easy for Huxley to clear up the teleological confusion that followed upon Darwin's metaphorical comparison of natural selection to the cultivation and domestication of plants and animals, there was no easy way to resolve doubts about the natural limits of variation within a species. Darwin considered that variation proceeded gradually and indefinitely, but no physical or mechanical demonstration of this was available. Variation was merely an observed "tendency," a logical counterpart to the genetic dictum that "like begets like;" and it was by no means obvious how to balance these two opposing but inevitable reproductive principles. In Darwin's

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<sup>8</sup> Ibid. pp. 37-56.

time, definitive statements about the role of variation in speciation were mooted by ignorance of variation's nature and cause.<sup>9</sup>

Darwin argued that variations were random with respect to their organic form and function, but this was not necessarily the common view. Darwin's meaning was most clearly explained by his "stone house" metaphor:

If an architect were to rear a noble and commodious edifice, without the use of cut stone, by selecting from the fragments at the base of a precipice wedge-formed stones for his arches, elongated stones for his lintels, and flat stones for his roof, we should admire his skill and regard him as the paramount power. Now, the fragments of stone, though indispensable to the architect, bear to the edifice built by him the same relation which the fluctuating variations of organic beings bear to the varied and admirable structures ultimately acquired by their modified descendants.

...  
The shape of the fragments of stone at the base of our precipice may be called accidental, but this is not strictly correct; for the shape of each depends on a long sequence of events, all obeying natural laws; on the nature of the rock, on the lines of deposition or cleavage, on the form of the mountain.... But in regard to the use to which the fragments may be put, their shape may be strictly said to be accidental.<sup>10</sup>

In Darwin's metaphor, the natural laws that determined inter-generational organic variation were remarkably impertinent to the needs of organic form and function. It was as if the stones from within an architectural edifice were being continuously displaced or supplemented by others taken at random from the base of a precipice. Darwinian variation could evolve and sustain viable organization only because every variation was subjected to a rigorous natural

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<sup>9</sup> *CE II*, pp. 33-34.

<sup>10</sup> Darwin, *Variation under Domestication*, op. cit. (Ch V, note 30) p. 430-1.

selection. Without selection, variation would proceed without a sense of form or function, more akin to the erosion of stone than to structural formation and maintenance.

Darwin used the “stone house” metaphor expressly to disagree with his friend and supporter Gray, the American professor, botanist, and natural theologian. Gray had written, as Darwin noted, of “his belief ‘that variation has been led along certain beneficial lines,’ like a stream ‘along definite and useful lines of irrigation.’” In Darwin’s estimation, this was like arguing that “[the Creator had ordained] that the crop and tail-feathers of the pigeon should vary in order that the fancier might make his grotesque pouter and fantail breeds....” The “grotesque” domestic breeds, which were not formed according to a natural selection, were what proof Darwin had that variation was not independently “definite and useful” but was dependent upon the selection process.<sup>11</sup> Was this enough, however, to demonstrate that the laws of variation played no determinative part in constructing biological forms?

Gray was the most significant American botanist of his day, lauded by Darwin for his contributions to and understanding and advocacy of Darwin’s science. Additionally, Gray was an evangelical Protestant and expert natural theologian; his several published considerations of Darwinism complemented Darwin’s own writings in expressing the gamut of natural theology’s prerogatives and possibilities within nineteenth-century Darwinian science. The language of

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<sup>11</sup> Ibid. p. 432.

teleology and design was used by Darwin only scientifically and transitionally, largely in order to dispense with design and explain in other ways its seeming importance to speciation. Gray, however, differed from Darwin not only in retaining design as part of his scientific explanation for speciation, but also by making natural theology into a particular topic of Darwinian thought.

For example, because *Origin of Species* had not provided a harmonization of “scientific theory with ... philosophy and theology,” Gray undertook this task on Darwin’s behalf.<sup>12</sup> This forced Darwin into a brief consideration of Gray’s natural theology – “a great difficulty,” Darwin said, “in alluding to which I am aware that I am travelling beyond my proper province” – with the expressed conclusion that “However much we may wish it, we can hardly follow ... Gray in his belief ... that each particular variation was from the beginning of all time preordained ... [by] an omnipotent and omniscient Creator....”<sup>13</sup> Darwin had probably overstated or misstated Gray’s claims, as we shall see; and Gray never conceded a necessary inconsistency between Darwinism and design. Even so, Gray was soon brought to the point of apologizing for his habitual admixture of science and natural theology, stating in the preface to his collection of *Darwiniana* that

... as to the natural theological questions which (owing to circumstances needless now to be recalled or explained) are here

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<sup>12</sup> Gray, Asa. *Darwiniana: essays and reviews pertaining to Darwinism*, ed. A. Hunter Dupree (Cambridge, MA : Belknap Press of Harvard University Press, 1963 [1876; 1860-1876]), at pp. 45-46 [1860].

<sup>13</sup> Darwin, *Variation*, op. cit. pp. 431-2.

throughout brought into what most naturalists, and some other readers, may deem undue prominence, there are many who may be interested to know how these increasingly prevalent views and their tendencies are regarded by one who is scientifically, and in his own fashion, a Darwinian, philosophically a convinced theist, and religiously an acceptor of the "creed commonly called the Nicene," as the exponent of the Christian faith.

In the aftermath of *Origin of Species*, natural theology was apparently losing its place, not only among naturalists and in the language of biological science, but among a more general readership.<sup>14</sup>

The loss of an audience, however, is not an intellectual resolution. Although it was broadly true that Gray had proposed, in Darwin's words, "that each particular variation was from the beginning of all time preordained," it is only by reading Gray that one may see precisely how that claim had been and came to be stated. As a naturalist, Gray was attempting by his stream metaphor to "save [Darwin] much needless trouble in the endeavor to account for the absence of every sort of intermediate [evolutionary] form" as well as of monstrous varieties of all sorts. In the metaphor, Gray's stream was the history of evolution – or, more properly, of inherited organic variation – which Gray thought should have been much less coherent than it was if natural selection were the only directional guide. Gray had presented the analogy this way:

Streams flowing over a sloping plain by gravitation (here the counterpart of natural selection) may have worn their actual channels as they flowed; yet their particular courses may have been assigned; and where we see them forming definite and useful lines of irrigation, after a manner unaccountable on the laws of

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<sup>14</sup> Gray, op. cit. p. 5 [1876].



gravitation and dynamics, we should believe that the distribution was designed.

Gary's claim was that evolution had gone in directions that natural selection could not explain, not only at the level of species, but of genus and order.<sup>15</sup>

The same claim was later stated in significantly different metaphorical terms, in which evolution was likened to the course of a sailing ship. Natural selection turned the ship's rudder, and variation was the wind; the course of evolution followed from both; and, although natural selection was a mechanically intelligible process, the wind seemingly had a mind of its own, its direction, force, and timing unpredictable. The wind metaphor succeeds better, perhaps – although historians cite it less often – because streams do not ordinarily have the power of escaping the laws of gravitation and dynamics in cutting their courses. Gray's point was that evolutionary "vessels" – that is, organisms and their modified descendants – had been "blown" at times and in directions that could not be explained by the action of rudders (natural selection) alone. The variable action of the wind, then, was evidently intended for the benefit of the organic vessels dependent upon it, and with the effect of rudders borne in mind.<sup>16</sup>

Gray's point against Darwin depended upon his ability to cite actual instances in which organic variation could not be explained by natural selection alone. This is the point at which Gray's claims became scientifically interesting,

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<sup>15</sup> Ibid. p. 120-122 [1860].

<sup>16</sup> Ibid. pp. 316-7 [1876]. The "lines of irrigation" metaphor alternatively suggests either uniform development (if the lines of the streams were self-determined) or superintended progress (if the lines were externally determined). The wind metaphor does not force this choice.

and the theological interest moved from there. The instances Gray provided – such as the metamorphosis of the flounder, the relative pollen production of certain trees, and some of the structural peculiarities of orchids – were compelling, at least, to Gray:

We really believe that these exquisite adaptations have come to pass in the course of Nature, and under natural selection, but not that natural selection alone explains or in a just sense originates them.<sup>17</sup>

It must be born in mind that Gray, although he disagreed with Darwin about the explanatory power of natural selection, was not confused about Darwin's explanation and was expert in its application. Gray's objections to random variation and natural selection as the entire explanation for evolution were presumably salient.

Further, it is probable that Gray's apologetic tone in *Darwiniana* was due less to scientifically suspect instancing than to the theological implications of his suggestion. For example, although Gray insisted that he had been "considering this class of questions only as a naturalist," he was nonetheless writing an essay on "Evolutionary Teleology" and preparing a concluding plea for natural theology, if not as a science, then, at least, as the legitimate concern of a scientific mind. Gray's conclusion to the essay (and to *Darwiniana*) was that

... there are ... mysteries proper to be inquired into and to be reasoned about; and, although it may not be given unto us to know the mystery of causation, there can hardly be a more legitimate subject of philosophical inquiry. Most scientific men have thought themselves intellectually authorized to have an opinion about it. ...

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<sup>17</sup> Ibid. pp. 308-20, at 319 [1876].

[A]nd this tradition ... illuminated by the Light which has come into the world – may still express the worthiest thoughts of the modern scientific investigator and reasoner.<sup>18</sup>

Gray's apologetic language suggests that natural theology, in 1876, was being considered not only to distract but to detract from scientific reasoning; and this despite the fact that he was not heavily sanitizing Darwinism with theology. Despite holding out for the importance of designed variation, for example, Gray acknowledged that "the action of [natural selection], at any given moment, is seemingly small or insensible; but the ultimate results are great." He thought it "not improbable that variation itself may be hereafter shown to result from physical causes." He admitted, also, that the vast majority of variations were "superfluous" to evolutionary history in a proportion that resembled the ratio of seeds to adult organisms in nature. Gray was challenging natural selection and random variation, not as a very good and important explanation for evolution, but as the entire explanation.<sup>19</sup>

It is tempting to conclude that Gray was apologizing for natural theology not because it interfered with science but because of an increasing presumption against natural theology's scientific character. Apparently, explicit design argument was no longer acceptable as even a complement to science or, at least, to Darwinian science. However, before admitting this conclusion, it is necessary to look more closely into what Gray was holding within his natural theology. The "wind" metaphor is very helpful in this regard because wind is

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<sup>18</sup> Ibid. pp. 319-20 [1876].

<sup>19</sup> Ibid. p. 317 [1876]; 62 [1860]; 128-9 [1860] and 306-10 [1876].

easily comprehended as something that may be largely due to intelligible natural dynamics and yet seems to contain an unpredictability of its own. Although imagining a stream of water that cuts a certain course for no good dynamical reason seems almost miraculous, the causes of the wind's force and direction were mysterious in a much more scientifically tolerable way. Those causes may be entirely physical; and, yet, the possible physical causes may be thought to indicate design; and, finally, it may be that the wind is subjected occasionally or, to some extent, continuously to the immediate will of God. In other words, Gray's natural theology was highly superintendental, seeing design both in mechanical explanations for evolution and in an evolutionary history that complemented and surpassed mechanical explanation. In fact, Gray explicitly applied superintendental reasoning to Darwinian evolution in a way that integrated the possibility of special creation:

To compare small things with great in a homely illustration: man alters from time to time his instruments or machines, as new circumstances or conditions may require and his wit suggest. Minor alterations and improvements he adds to the machine he possesses; he adapts a new rig or a new rudder to an old boat: this answers to Variation. ... Now, let a great and important advance be made, like that of steam navigation: here, though the engine might be added to the old vessel, yet the wiser and therefore the actual way is to make a new vessel on a modified plan: this may answer to Specific Creation. Anyhow, the one does not necessarily exclude the other. Variation and natural selection may play their part, and so may specific creation also. Why not?<sup>20</sup>

Why not, indeed? Superintendental natural theology in Darwinian science allowed for a frustrating hodge-podge of possibilities within its "naturalistic"

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<sup>20</sup> Ibid. p. 77 [1860].

reasoning. How could a natural historian tell the difference between variation naturally occurring and an organism specifically created as a modification of an earlier plan?

Moreover, the close association of superintendence with theological providence was explicit in Gray:

It need not much trouble us that we are incapable of drawing clear lines of demarkation between mere utilities, contingent adaptations, and designed contrivances in Nature; for we are in much the same condition as respects human affairs.... What results are comprehended in a plan, and what are incidental, is often more than we can readily determine in matters open to observation. ... But the higher the intelligence, the more fully will the incidents enter into the plan, and the more universal and interconnected may the ends be. ... Design in Nature is distinguished from that in human affairs – as it fittingly should be – by all comprehensiveness and system. Its theological synonym is Providence. Its application in particular is surrounded by similar insoluble difficulties; nevertheless, both are bound up with theism.<sup>21</sup>

The ability of this line of superintendental reasoning to suggest evolutionary science is questionable; and, moreover, it envisions science as a theological provenance subject to the difficulties of providential theism. Is there harm in that? There may be. Although Gray allowed that Darwinism may be variously interpreted, he warned that considering the “origin of the actual species [to be] incompatible with final causes and design, is to take a position ... highly unwise and dangerous.... We should expect the philosophical atheist or skeptic to take this ground....”<sup>22</sup> In this light, Gray’s generally irenic tone may seem somewhat

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<sup>21</sup> Ibid. 312-13 [1876].

<sup>22</sup> Ibid. p. 122 [1860].

bullying for providence. His natural theology, which made Darwin's evolutionary mechanism into a tool for the superintendence of natural history, recalled the difficulties and tensions of an earlier era of theological complicity in the practice of science. Conceptually, at least, science remained a theological endeavor.

### **A. R. Wallace and Darwinian natural theology**

Different problems for the relation of Darwinian scientific thought to natural theology were raised by Wallace, the co-originator with Darwin of the theory of natural selection. Although from the beginning Gray had acknowledged reservations about natural selection as the sole explanation for evolution, Wallace was considered a pure advocate who later changed his mind about the evolution of human being. This apparent reappraisal – and Wallace's related conviction that the origins of life and consciousness were materially inexplicable – often has been considered a byproduct of his conversion to spiritualism. Charles H. Smith has argued, however, that Wallace never intended natural selection to be a complete theory of evolution. Rather, Wallace thought natural selection would account for functional adaptation as a determinant of organic form while referring other aspects of evolution to higher powers or laws for their explanation.<sup>23</sup> If Smith is correct, then Wallace should not be understood to have defected from Darwinism in favor of spiritualism but to have been consistent in his larger understanding of natural selection and evolutionary theory.

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<sup>23</sup> Smith, Charles H. "Alfred Russel Wallace on Man: a famous 'change of mind' – or not?" in *History and Philosophy of the Life Sciences* 26, 2 (2004): 257-70.

The doubtful influence of Wallace's spiritualism upon his science makes it difficult to understand his relation to natural theology, as well. Associating spiritualism with inexplicable and supernatural events would be strictly inaccurate, however, because Wallace regarded spiritual phenomena as an integral part of the natural world in complement to the known laws of physics. Because physical forces whose effects may be well understood remained unknowable in their essence and seemed to be absolutely immaterial (the epitome was gravity and Newtonian physics – although some physicists were speaking weightily of an imponderable ether), Wallace felt justified in qualifying those forces as "spiritual" and categorizing them with other, more nominally spiritual forces such as vitality and consciousness. At the time, this was an unwelcome challenge to the nearing equation of science to the principles of positivism and materialism.<sup>24</sup>

Wallace was not severing ties to empirical science, however, by playing counterpoint to positivism. In his view, the "laws" of vitality and consciousness were made evident by organic formation similarly to the way in which the laws of physics were made evident by planetary and cosmic formation. The key, for Wallace, was the conviction that vital material processes differed from non-vital material processes in ways that could not be derived from the laws and properties of inorganic matter. Instead, a "spiritual influx" was needed to account for the initial transition to life from a particular material or molecular

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<sup>24</sup> Wallace, *Darwinism*, op. cit. (Ch V, note 29), p. 237.

arrangement. Similarly, a spiritual influx was required to transition to consciousness from unconscious forms of life. Material and biological preparations for these categorical transitions may have been infinitely gradual, but none of the transitions followed as a predictable consequence of the laws that governed their preparation. Novel forces spontaneously appeared, and it was under the new pressures of vitality and consciousness that Darwinian evolution had ever occurred.<sup>25</sup>

Of course, Darwin's theory presumed rather than explained the existence of living organisms, and the evolution of consciousness was also difficult to consider scientifically other than as a correlation of brain and nervous development, a correlation that Wallace was not contesting. In 1864 he wrote what appeared to be a satisfactorily Darwinian account of the evolution and antiquity of human being, including both brains and "mind."<sup>26</sup> His public association with spiritualism would begin a few years later but did not seem to interfere with his Darwinian efforts and convictions.

The problems with Darwinism did not appear until as late as 1870, when Wallace collected the most significant of his previously published "Darwinian" essays into a single volume of *Contributions to the Theory of Natural Selection*. The *Contributions* concluded with a new essay that conveyed a startling revelation:

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<sup>25</sup> Ibid.

<sup>26</sup> Wallace, Alfred Russel. "The Origin of Human Races and the Antiquity of Man Deduced From the Theory of 'Natural Selection,'" (1864); *Contributions*, op. cit. pp. 303-331.



It will ... probably excite some surprise among my readers, to find that I do not consider that all nature can be explained on the principles of which I am so ardent an advocate; and that I am now myself going to state objections, and to place limits, to the power of "natural selection." I believe, however, that there are such limits; and that ... we can trace ... in the development of organic form ... the action of some unknown higher law, beyond and independent of all those laws of which we have any knowledge. We can trace this action more or less distinctly in many phenomena, the two most important of which are – the origin of sensation or consciousness, and the development of man from the lower animals.<sup>27</sup>

Wallace then argued over twenty-five pages that Darwinism was unable to account for the appearance of some of the physical attributes of human beings – such as brain size, relative bodily hairlessness, the "specialization and perfection" of the hand and foot, and the "wonderful ... sounds producible by the human larynx..." – whose gradual development was said to be unaccountable upon the principles of natural selection; as was also that of the "mental faculties" and the "moral sense" of human beings.<sup>28</sup>

In itself, perhaps, the appeal to "some unknown higher law" need not have distracted anyone. The difficulty, however, was that Wallace did not conclude by appealing to a higher law in any conventional sense but by further drawing the "inference ... that a superior intelligence has guided the development of man in a definite direction, and for a special purpose, just as man guides the development of many animal and vegetable forms." This was a superintendental view, and Wallace expounded upon it.

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<sup>27</sup> Wallace, *Contributions*, op. cit. pp. 332-333.

<sup>28</sup> Ibid. pp. 335-60.

The laws of evolution alone would, perhaps, never have produced a grain so well adapted to man's use as wheat and maize; such fruits as the seedless banana and bread-fruit; or such animals as the Guernsey milch cow, or the London dray-horse. Yet these so closely resemble the unaided productions of nature, that we may well imagine a being who had mastered the laws of development of organic forms through past ages, refusing to believe that any new power had been concerned in their production, and scornfully rejecting the theory ... that in these few cases a controlling intelligence had directed the action of the laws of variation, multiplication, and survival for his own purposes. We know, however, that this has been done; and we must therefore admit the possibility that ... some higher intelligence may have directed the process by which the human race was developed.... At the same time I must confess, that this theory has the disadvantage of requiring the intervention of some distinct individual intelligence, to aid in the production of what we can hardly avoid considering as the ultimate aim and outcome of all organized existence – intellectual, ever-advancing, spiritual man. It therefore implies, that the great laws which govern the material universe were insufficient for his production, unless we consider ... that the controlling action of such higher intelligences is a necessary part of those laws, just as the action of all surrounding organisms is one of the agencies in organic development.<sup>29</sup>

Wallace remarked, as well, that to "infer the action of mind" and "a new power of a definite character" from physical preparations made for the subsequent development of human intellectual nature was "as strictly in the bounds of scientific investigation as ... any other portion of my work."<sup>30</sup>

Although these lines were written by an expert in Darwinian science more than a decade after the publication of *Origin of Species*, they remained as complete and straightforward an expression of scientifically superintendental thinking as any made by a natural historian since Buckland's original proposal

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<sup>29</sup> Ibid. pp. 359-60.

<sup>30</sup> Ibid. p. 335.

that geological forces had operated “not blindly and at random, but with a direction to beneficial ends ... [indicating] an overruling Intelligence continuing to superintend ... the agents, which he originally ordained.”<sup>31</sup> Moreover, it may be that Wallace had been even more deliberate than Buckland in proposing a design argument that was to be contrasted to a history of arbitrary interventions, because Wallace had explicitly escaped “the disadvantage of requiring ... intervention” by proposing that “the controlling action of ... higher intelligences is a necessary part” of the laws that always govern the material universe. Although the precise sense in which “intelligences” may be categorized with “laws” is not made clear by Wallace (and this categorization may have been implicit in his opening appeal to a higher law of evolution, as well), the most straightforward sense is that the intelligences were ruled by the “ultimate aim ... of all organized existence” in exercising their direction over the laws of nature. In Wallace’s view, the whole material and organic universe was intended for intelligent direction according to plan. Natural history was superintendental in design, order, and conduct.

Predictably, Wallace drew critical fire upon publishing this particular “contribution” to the theory of natural selection. He did not back down, but responded with a clarification that could only have emboldened his opponents. He claimed to have been “misunderstood” by critics who accused him of believing “unphilosophically ... that ‘our brains are made by God and our lungs by

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<sup>31</sup> Buckland, *Vindiciae*, op. cit. (Ch I, note 29), pp. 18-9.

natural selection;’ and that ... ‘man is God’s domestic animal.’” He denied having made God responsible for human evolution and explained that, although “Angels and archangels, spirits and demons, [have become] unthinkable as actual existences” in modern philosophy, nonetheless, he had been referring to intelligent beings that were posited philosophically and as “an outcome of science” to exist in degrees between human intelligence and “the Great Mind of the universe.”

Now, in referring to the origin of man, and its possible determining causes, I have used the words "some other power"--"some intelligent power"--"a superior intelligence"--"a controlling intelligence," and only in reference to the origin of universal forces and laws have I spoken ... of "one Supreme Intelligence." [These expressions] were purposely chosen to show, that I reject the hypothesis of "first causes" for any and every *special* effect in the universe, except in the same sense that the action of man or of any other intelligent being is a first cause. ... I wished to show plainly ... the possibility that the development of the essentially human portions of man's structure and intellect may have been determined by the directing influence of some higher intelligent beings, acting through natural and universal laws. A belief of this nature may or may not have a foundation, but it is an intelligible theory, and is not, *in its nature*, incapable of proof; [it would be exactly similar to deducing], from the existence on the earth of cultivated plants and domestic animals, the presence of some intelligent being....<sup>32</sup>

This passage states Wallace’s commitment to spiritualism very starkly and is well worth quoting at length for that reason. Of course, it is (and was) difficult to read such a passage without being discomfited by Wallace’s naïve expectation that science and spiritualism could be credibly mixed – a concoction that Huxley caricatured as Wallace’s belief in human development by “a sort of supernatural

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<sup>32</sup> Wallace, *Contributions*, op. cit. pp. 372-372A.

Sir John Sebright.” (Sebright was a renowned bird fancier). However, as is generally the case with Huxley, his caricature identified the chief characteristics of its subject: Wallace’s principal claims were that the development of the human form had been (as Huxley put it) “superintended,” and that superintendence advanced a case for spiritualism as an outcome of science. Although it would be foolish to accept at face value Huxley’s exaggerated comparison of Wallace’s Darwinism to supernatural bird-fancying, nonetheless, historical appreciation of Wallace’s view does fairly begin by considering the mediate relation of superintendential design argument to the history of science in Britain. The immediate comparison of scientific positivism and evolutionary science to spiritualism and supernaturalism leads to nothing but the perpetuation of Huxley’s point of view.<sup>33</sup>

It has been a major concern of my dissertation to show that the relation of theological superintendence to natural science in Britain had been close, subtle, and shifting, but not identical. Generally, natural theologians had been wont to consider design argument as broadly scientific or, perhaps, as a distinctly theological science rather than as a definite component of the physical sciences. Indeed, to admit design argument into the physical sciences would have worked against the overriding concern of formulating a liberal and theological comprehension of science. Zoology and botany, of course, had been problematic in this regard because the concept of utilitarian design had long

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<sup>33</sup> *CE II*, p. 120-22; 161-65; 173-79; 184-86.

figured significantly into scientific explanations of specific organic form. Whewell, for example, had considered it impossible even to begin to understand biological organization except by premising the “fundamental idea” of specific utilitarian design. Nonetheless, an idea is not an argument; and Whewell had always considered design arguments to be properly a consequence and not an aspect of physical science.

In Britain, the move from utilitarian to developmental thinking in explanation of specific form had been closely associated with the publication of *Vestiges* and with subsequent criticism of the developmental hypothesis by utilitarian and superintendental natural theologians such as Whewell. This controversy had caused natural theology to be closely and rather casually associated with opposition to development and, by extension, antagonism to Darwin’s ideas. Unfortunately, this simple opposition seriously mischaracterizes a much more complex relationship and history. As Chapter Three has shown, the criticisms of *Vestiges* by natural theologians had been scientifically expert, although they had been theologically concerned. Furthermore, a credible and specifically Anglican defense of development had been presented by the very liberal natural theologian and philosopher of science Baden Powell. It was Powell’s point that developmental progress (embryological development provides the epitome) characteristically displays order, direction, and causal uniformity; and this idea had premised a design argument that had advocated uniform progression in natural history to the exclusion of discontinuity and

superintendence. Powell's natural theology of development had echoed and substantiated the theme of "creation by law" that had been advocated in *Vestiges* as a theological parallel to the hypothesis of development. *Vestiges*, however, had notoriously failed to provide credible causes in support of specific organic developments and, as Huxley had severely objected, had sometimes mistaken the "law of development" for a causal entity, so that development was considered to be self-causing and self-explanatory. The vapidness of that hypothesis was a chief reason why utilitarian and superintendental thinking had retained their potency against all developmental hypotheses even until the late 1850s. However, Darwin and Wallace had ended this historic theological and scientific standoff or, as Bowler would have it, this conceptual "logjam" by proposing a credible mechanics of evolution.<sup>34</sup> Subsequently, the nineteenth-century debate over organic form was partially transformed into a consideration of the ways in which the mechanics of Darwinism could be said to indicate design.

Wallace's place in the new flow of scientific ideas, however, is not well represented by the subsequent history of Darwinian science. The historical accident that had assigned to Wallace and Darwin a technical share in originating a theory of natural selection also ensured that Wallace would be largely considered Darwin's lesser partner. Viewed as an outgrowth of his presumed Darwinism, Wallace's objections to natural selection as an explanation of human

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<sup>34</sup> Bowler, *Non-Darwinian*, op. cit. (Ch II, note1) pp. 47-66.

development seem very curiously construed. But Wallace, writing from somewhere in the jungles of Borneo, would not have understood his initial thinking, at least, in terms of this historical accident. If the overriding concern for Darwinism is appropriately replaced by a broader and prior concern for science, natural philosophy, and natural theology, then Wallace's evolutionary views take on a very different significance. According to this line of reasoning, what is most significant about Wallace's ideas is their mutual connection to the previously distinct traditions of developmental and superintendental ways of understanding natural history. It is remarkable, even extraordinary, that Wallace's deviation from Darwinism should have taken the form of a superintendental understanding of development, and, seen in this light, his reasoning becomes less fanciful than when viewed as the outcome of supposedly cross-bred commitments to science and spiritualism.

Generally, historians of science have associated the post-Darwinian idea of designed or guided evolution more closely with earlier developmental thought than with the directed discontinuity of the catastrophists and superintendentalists, as well as more closely with science than with natural theology.<sup>35</sup> However, as argued in Chapter Four, there are no logically or historically sound reasons for those preferences; and it is at least possible that the historiographical difficulty of placing Wallace among Darwinian or post-Darwinian thinkers highlights their implausibility, as well. In pre-Darwinian

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<sup>35</sup> E.g. Brooke, "Between Science and Theology," *op. cit.* (Ch 1, note 16), pp. 56-61.



thought, the debates between causally uniform progress (development) and intelligently directed progress (superintendence) had been increasingly associated with scientific discussion after the publication of *Vestiges* (1844). As we have seen, if the details of this controversy are studied carefully, then even the categorical distinction between developmental and superintendential thought appears to have been misleadingly nominal. Both, for example, accepted the idea of gradual progress in natural history and, in that sense, at least, were equally “developmental.” The real objection of the superintendentalists was not to development in all respects but to causal uniformity or, in other words, to the idea that progress in natural history was synonymous with uniform development. If the possible causes of progress are considered to be distinct from the argument for uniformity, then the logical distinctions between development and superintendence tend to break down. Gray, for example, quickly came to think of Darwinian evolution as “directed” or “guided” in a markedly superintendential way; and now Wallace, who described his understanding of human development also as “directed” and “guided,” is seen to have done a similar thing.

In stating his objections to Darwin, however, Gray had conformed to intellectual types by associating natural theology with the Christian comprehension of science and, also, by distinguishing a naturalist’s concern for the laws of nature from a natural theologian’s concern for the relation of those laws to the special or higher direction of natural history. Gray also apologized for admixing science and natural theology. In marked contrast, Wallace neglected

these typical distinctions. He insisted that his argument for the superintended development of human being was not less scientific than was the claim that natural selection could explain the non-human organic world. The implications of such a view are worthy of extended comment.

By classifying superintendence as scientific, Wallace implicitly denied that the natural world was scientifically unintelligible except upon the presumptions of uniformity and positivism. In this respect, his post-Darwinian understanding of science was not remote from views the catastrophists had held in controversy with uniformitarians forty years earlier. Nonetheless, Wallace had clearly refused any explicit association with natural theology by employing his design argument in the interests of spiritualism and science rather than theism and Christian faith. Perhaps this was to be expected from a radical free-thinker whose concern was less for God and religion than for the natural existence and deathly predicament of the human spirit. Nor is it surprising that Wallace, who had been an appreciative reader of *Vestiges*, would neglect to mention the resemblance of his views to those of *Vestiges*' theological critics. By considering superintendence to be a "strictly scientific" argument, by categorizing intelligent immaterial agency among the laws of nature rather than the claims of theology, and by separating the life of the human spirit from the concerns of religion, Wallace was negating distinctions that were widely accepted in recognition of natural theology and the differentiation of science and religion in Britain. It may be added that, in many ways, these radical ideas in Wallace are logical extensions of the naturalization of

Anglican theology that had been pursued forty years earlier by Sedgwick in the interests of a liberal and scientific Anglican theology, as discussed in Chapter Two. How far wrong would it be to say that Wallace's superintendential argument for spiritualism was natural theology without the theology?

After decades of increasingly close association between natural theology and science, superintendential design argument was being removed from the realm of theology entirely and represented by Wallace as a scientific and spiritual rule of the universe. Of course, this does not deny that Wallace's argument for superintendence was adaptable for use by a natural theologian; nor does it affirm that men of science were pleased to have spiritualism associated with their emergent profession. It does, however, display continuity between Wallace's views and the history of natural theology in Britain.

There is also another way in which Wallace may befuddle the standard historiographical account of Darwinian science's distinction from and destruction of natural theology. Although many of Darwin's critics – and in this, Gray is representative – had argued that natural selection was insufficient to explain organic evolution, Wallace was alone in accepting natural selection as a "law" of organic nature – a scientific explanation so secure that aspects of nature exceeding its scope would demand a complementary explanation, not a rejection or modification of the law.<sup>36</sup> Even Darwin would not go so far. Of course, Wallace

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<sup>36</sup> Wallace understood that natural selection was a "law" of nature in a particular way. He claimed, for example, that the available evidence for the action of natural selection was better "than even direct observation would be, because it is more universal, viz., the evidence of necessity. It must be so;" and he "deduced" the origins and antiquity of the human races from

believed that the development of human being exceeded natural selection's explanatory power. What is equally remarkable, however, is that Wallace then returned to the metaphor of cultivated plants and domestic animals in explanation of human being. This had been Darwin's first metaphor for natural selection in *Origin of Species*, of course; and, if you accept it as inherently Darwin's, then Wallace may be considered to have gone back on Darwinism when he reverted to the metaphor's original, intentional significance, which Darwin had certainly abandoned. However, it is inappropriate to think of Wallace that way. He had initially discussed the breeder metaphor – and rejected it as inappropriate to selection under the conditions of nature – without knowing what Darwin was doing with it.<sup>37</sup>

The challenge for historians is to recognize that selective breeding is not Darwin's metaphor inherently and absolutely. Wallace's reversion to a non-Darwinian use of the metaphor, especially, reveals its first and undeniably superintendential significance. Although Darwin would use the idea of a natural selection to remove the initial suggestion of intention from his explanation of evolution; nonetheless, the metaphor of a pigeon fancier in its initial significance was thoroughly superintendential. Indeed, there had been a great initial confusion in many of Darwin's readers concerning the proper relation of a natural to an intentional selection, and Huxley as well as Darwin had fought hard against

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the theory of natural selection. See "The Origin of Human Races," op. cit.; *Contributions*, op. cit. at p. 309.

<sup>37</sup> Wallace, "Tendency," op. cit.

that confusion. Of course, presuming that only Darwin made a scientifically appropriate use of the metaphor will blot from the history of science the metaphor's remarkable susceptibility to superintendental interpretation. That very presumption, however, is what Wallace disputed. His status as a Darwinian and scientific thinker is a challenge for historians today.

The challenge is severe, moreover, because of its importance for a reconsideration of views that historians of science and theology have generally considered to be nearly dismissible, such as those represented by Argyll. In *The Reign of Law*, Argyll spoke of superintendence in terms of evident providence and supernatural (or, in his preferred terms, "superhuman") contrivance – very volatile categories of mid-Victorian thought – and he listed Darwinism with other naturalistic theories that, in Argyll's view, could prove nothing more than that God had created specific things by superintending their natural development. Interestingly, Argyll not only considered the development of human being to be the result of superintendence, as would Wallace; he also made use within his design argument of the apparently contrived adaptations of orchids, as had Gray. The logical and evidential relation of Argyll's natural theology to evolutionary science may be more important and significant than has been supposed.<sup>38</sup>

Although Argyll has been taken seriously by Desmond, at least, as a political force within evolutionary debates, his intellectual place in those debates

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<sup>38</sup> Campbell, *Reign of Law*, op. cit. (Ch I, note 3), especially at Chapter One, pp. 1-52, and Chapter Three, pp. 128-180.

may prove important to reconsider.<sup>39</sup> Especially, it may be asked why the views of Argyll, Wallace and Gray were received so dissimilarly by all parties in the Darwinian controversies, despite some similarity in their reasoning. One important consideration, of course, is the degree of scientific expertise – much lessened in the case of Argyll – and of explicit theological purpose – much greater in Argyll’s case – that each man brought to his review of how natural history escaped the explanatory confines of natural selection and causal uniformity. More fully, however, the different public reactions to Gray, Wallace, and Argyll may be referable to historically prior distinctions, such as those drawn in Chapters Two, Three and Four, between the philosophical and academic natural theologies of Sedgwick and Whewell, the popularly read natural theologies of *Vestiges* and Hugh Miller, the more immediately social and political natural theologies of Brougham, Turton, and Irons, and the deliberate excision of any form of natural theology from scientific discourse that was practiced by Huxley prior to his public defense of Darwinism. I doubt that the public and scientific standing of the directional views of Wallace and Gray, among the Darwinians, and of Argyll, among Darwinism’s opponents, may be adequately understood without attending closely to Darwinism’s connection to earlier controversies in superintendental and developmental science and natural theology.

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<sup>39</sup> Desmond, *Archetypes*, op. cit. (Ch I, note 11).

At the very least, reading Gray and Wallace must cause many historians to reconsider their belief that Darwinism and the publication of *Origin of Species* represented an evaporation of the scientific waters in which natural theology had been swimming for centuries. Such a belief grants to Huxley and likeminded others the power of having historians to understand Darwinism as he would have had us do it. Yet, other than Darwin himself, there may have been no men of science possessed of a better understanding of, or more prominently associated with Darwinism than were Gray and Wallace on their respective sides of the Atlantic. Even Huxley must yield to them, at least, upon the point of a detailed understanding. It is surely significant, then, that Gray and Wallace both urged that natural theology be counted, not as Darwinian science, but as part of the broader category of Darwinian scientific thought. Our next step, then, is to consider what Huxley made of such proposals for a Darwinian natural theology.

### **Huxley and Darwinian natural theology**

Huxley responded to Wallace but not Gray, a fact that physical and social geography may well explain. Fortunately for this study, however, Wallace had raised issues of greater interest to historians of science and natural theology. His initial criticism of natural selection, which had come comparatively late and was fused to a defense of spiritualism and superintendental natural philosophy, presented Huxley with an intricate ball of political, social, and definitional threads to unravel. A decade earlier, and only six months after publication of the first

edition of the *Origin*, Huxley had represented the Darwinian hypothesis as an unqualified boon to liberal thought, excitedly writing that "every philosophical thinker hails it as a veritable Whitworth gun in the armoury of liberalism."<sup>40</sup> But this initial liberal euphoria over evolution, if it ever existed, had been quick to dissipate. People who had been accepted as liberal and Darwinian were soon suspected of harboring other designs. Chief among the newly suspect was probably Mivart, who committed what, to Huxley, was the ultimate sin of vocally abandoning Darwin for Rome; Huxley never defended Darwin more fiercely than from Mivart. Wallace, however, was also seen as a fracture in the block of early liberal support for Darwin.

Wallace's views, moreover, were much more difficult to redress, because it was often his support rather than his criticism of Darwin that was unwanted. For example, although Wallace genially accepted subordination in having first proposed the theory of natural selection, yet he remained a qualification in perpetuity of Darwin's liberally advertised authority and originality.<sup>41</sup> Similarly, although he promoted natural selection as a law of nature, he stated it to be a penultimate explanation of evolution. He claimed that there was an empirical basis for spiritualist beliefs; and Huxley, who despised spiritualism for its credulity and social marginality, was too much an empiricist to presumptively

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<sup>40</sup> *CE II*, p. 23.

<sup>41</sup> *CE II*, p. 184-6.



dismiss that claim from scientific court.<sup>42</sup> Moreover, land nationalization was too radical a proposal to be safely associated with liberal scientific professionalism, even to the mind of an anti-cleric such as Huxley; and Wallace presided over the land nationalization movement while eschewing the emergently professional scientific societies of Huxley's London as inimical to a true spirit of discovery.

In the end, although deserters from Darwinism such as Mivart received no courtesy from Huxley, Wallace received the measured respect of an intramural dissenter. The difference in Huxley's consideration of Mivart and Wallace in the essay "Mr. Darwin's Critics," for example, was unreasonably extreme.<sup>43</sup> A proper explanation of Huxley's response to Wallace's view of human evolution would need to account for these many factors. However, what is of greatest importance now is not a full explanation but a limited analysis of Huxley's engagement with Wallace in its significance for the history of Darwinian science, teleological argument, and natural theology. To this purpose, a few more contextual observations would be helpfully made.

In "Mr. Darwin's Critics," Huxley accepted Wallace's criticisms of Darwin, as he also did Mivart's, as "an attention to those philosophical questions which underlie all physical science, which is as rare as it is needful." One point that Huxley found very objectionable, however, was Mivart's off-handed remark that

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<sup>42</sup> Huxley, Thomas Henry. "Report on Spiritualism," *Daily News Review*, October 17, 1871; "Spiritualism Unmasked," *Pall Mall Gazette*, January 1, 1889; "Professor Huxley and the Spiritualists," *Pall Mall Gazette*, January 12, 1889.

<sup>43</sup> *CE II*, 120-86.

"Mr. Darwin and others may perhaps be excused if they have not devoted much time to the study of Christian philosophy;" and much of Huxley's work in the essay was to trace – it may be better characterized as stalking – Mivart's steps in a tour of Christian theological and dogmatic history. In the process, Huxley tested and found wanting Mivart's claim "that ancient and most venerable theological authorities distinctly assert *derivative* creation, and thus their teachings harmonise with all that modern science can possibly require."<sup>44</sup>

Huxley's relentless pursuit of Mivart and Catholic tradition has been used by historians to support the claim that Huxley's interest in Darwin was motivated less by science than by anti-clericalism and the professional need to liberate science from theology.<sup>45</sup> The truth of this may be substantially granted. It is an important qualification, however, to note that Huxley, in responding to Mivart, explicitly affirmed that theological problems are among "those philosophical questions which underlie all physical science." The same affirmation underlay Huxley's response to Wallace.

This is not to say, of course, that Huxley thought religion was basic to science. The point is more nearly opposite: Huxley was allowing that one of the basic reasons for doing science was to arrive at natural philosophical truth in points of religion. This fairly echoed what the natural theologians of this study had always claimed: that the scientific veracity of natural theology could

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<sup>44</sup> *CE II*, 124-6.

<sup>45</sup> For the opposite view, see Lyons, *op. cit.* (Ch IV, note 1), pp. 267-74.

legitimate the Anglican political establishment at a time when traditional authorities and special revelations were being widely rejected as inadequate to the task. In fact, Huxley's notice that "attention to those philosophical questions which underlie all physical science ... is as rare as it is needful" is a substantial echo of Brougham's complaint, made four decades earlier in the introduction to his *Natural Theology*, that "scientific men were apt to regard the study of Natural Religion as little connected with philosophical pursuits."<sup>46</sup> Indeed, since Brougham's heyday, as argued in Chapter Two, natural theology had been supposed to set liberalism and science against traditional authorities and revelations in matters of concern to the religious establishment. It had been a common liberal theme that revelation and tradition were incredible without natural theology. In his dispute with Mivart, then, Huxley needed only to assume, in accordance with decades of natural theology written from a liberal perspective, that any authority adequate to the legitimacy of religion must be adequate to criticizing it, as well.

Remarkably, Huxley could easily make this assumption. At this point in my argument, however, this will (or ought to) seem remarkable only because it has not been thought necessary heretofore to properly explain it. Until now, historians have been willing to attribute the comparatively favorable reception of Darwinism to public exhaustion over the earlier, sensational controversy over

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<sup>46</sup> See Ch II, notes 64 and 67.

*Vestiges*.<sup>47</sup> Fundamentally, this historiography proposes that evolution was not so bad an idea once people had got used it. As we have seen, however, there was a great deal more to the story than that.

The controversy over *Vestiges* had not concerned only whether the natural world had “developed” or been “created.” It also had concerned, and much more significantly, a possible Anglican comprehension of the practices and institutions of science. Everything that Huxley now required to set Darwinian science against Mivart’s religion – including intellectual and social respectability and responsibility – had been provided to him by four decades of pre-Darwinian natural theology; even including – if you credit the interpretations of historians of science such as Cannon, Ospovat and Gillespie – Darwin’s theory itself.<sup>48</sup> There is no way, then, to oppose scientific Darwinism to the history of natural theology; no, not even when Darwinism is found in Huxley’s hands, at his most fanatically anticlerical moment, being used as a weapon of science in an attack upon religion. Huxley’s forceful success against Mivart was not gained only by a general acquiescence to the idea of evolution, nor did it depend only upon Darwin’s scientific merit and prestige in comparison to that of the clergy. It followed, more seriously, from public recognition of a new and liberal authority in religion, the result of earlier attempts to liberalize the Anglican establishment and

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<sup>47</sup> Secord, *Victorian Sensation*, op. cit. (Ch I, note 17), pp. 515-32.

<sup>48</sup> Cannon, “Darwin’s Achievement,” op. cit. (Ch II, note 1); Ospovat, *Darwin’s Theory*, op. cit. (Ch II, note 1); Gillespie, *Charles Darwin*, op. cit. (Ch I, note 10).

make it more scientific. Huxley could assume the authority of the scientific natural theologian in his defense of Darwin and counterattack upon Mivart.

We may conclude, then, that Darwinian thought, especially in controversy with religion, was a part of the long and publicly attested relation of science to natural theology in Britain. It is as properly a part of natural theological history as of the history of science. Mivart, by contrast, had dissented from Darwin by appeal to the authority of Catholic tradition. This was not an impotent appeal, because it could claim allegiance to the contemporary Anglo-Catholic movement. It must be allowed, then, that the prestige of scientific natural theology in 1871 was comparable to that of a very powerful and more overtly religious phenomenon; and this conclusion defies the widespread notion that Darwinism had put a stop to natural theology. This allowance must be made, moreover, although it was part of Huxley's scientific industry to distinguish Darwinism from natural theology as much as possible. It may be stated, in sum, as a principal conclusion of this dissertation, that Huxley rode the high tide of liberal natural theology when he set Darwinism to break upon the wavering restraints of Christian tradition. It only remains to show that the scientific logic of Darwinism, in the aftermath of the publication of the *Origin*, was no less a part of natural theological history than was its social note.

In referring evolution to Catholic dogma, the anti-Darwinian Mivart had suggested a superintendential view of the creation of life.

As much as ten years ago an eminently Christian writer observed:  
'The creationist theory does not necessitate the perpetual search

after manifestations of miraculous power and perpetual "catastrophes." Creation is not a miraculous interference with the laws of Nature, but the very institution of those laws. Law and regularity, not arbitrary intervention, was the patristic ideal of creation. With this notion they admitted, without difficulty, the most surprising origin of living creatures, provided it took place by *law*. They held that when God said, "Let the waters produce," "Let the earth produce," He conferred forces on the elements of earth and water which enabled them naturally to produce the various species of organic beings. This power, they thought, remains attached to the elements throughout all time.'

... As to the present day ... there are many as well versed in theology as Mr. Darwin is in his own department of natural knowledge, who would not be disturbed by the thorough demonstration of his theory [or] be in the least painfully affected at witnessing the generation of animals of complex organisation by the skilful artificial arrangement of natural forces, and the production, in the future, of a fish by means analogous to those by which we now produce urea.<sup>49</sup>

Such passages are remarkable, of course, for their ambiguity in specifying the orderly manner in which organic creation was "instituted" as an elemental power. It is not necessary, however, to know definitively whether Mivart's analogy to a "skillful artificial arrangement" of things was basic or transient to his evolutionary view. Ambiguity was generally sufficient (or even helpful) to the recommendation of superintendential arguments; and it is, of course, a restrictedly theological problem to decide whether a design argument that may have been premised upon natural uniformity could lend credence to a religious authority that was premised upon special revelation. The majority of nineteenth-century theologians who were able to declare Christianity compatible with Darwinism would take intellectual residence within ambiguities of this sort. Gray and Mivart are fair

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<sup>49</sup> *CE II*, 126-28.

examples of many others. They emphasized what natural philosophy did not know and made Darwinism into one aspect of a larger and theologically presumptive understanding of "guided" evolutionary development.

The principal advantage of focusing upon Wallace is that he had proposed a superintendential argument that was based upon the scientific precision rather than the philosophical qualification of natural selection. Wallace was not as sparing of natural selection's explanatory power as was Gray, for example, whose teleology had been proposed to "save" Darwin from the "needless trouble" of accounting for significant aspects of organic history. Wallace's point, by contrast, was very demanding: he claimed that the relation of natural selection to "many phenomena" was analogous to the relation of a natural species to cultivated and domesticated varieties. The order of Wallace's logic is important. He was not arguing that, for all anyone knew, natural selection was consistent with the presumption of theological superintendence. Rather, he presumed the non-intentional mechanics of natural selection and argued that their mechanical relation to definite phenomena suggested a superintendential analogy. His claim was not that the superintendence of evolutionary history remained philosophically plausible, but that the theory (he preferred to say the "law") of natural selection had furthered the approach to a scientific demonstration of spiritual superintendence.

Although Huxley disagreed with this claim, he did not treat it contemptuously. The jest about a "supernatural Sir John Sebright," for example,

served better to relieve the tension over Wallace's celebrated faux pas than to pile on in contempt. Although the nature of Wallace's objections to natural selection did not then allow for definitive resolution, Huxley did his best to meet the more debatable of them within reason. He particularly responded to Wallace's claim that, "whether we compare the savage with the higher developments of man, or with the brutes around him, we are alike driven to the conclusion, that, in his large and well-developed brain, he possesses an organ quite disproportioned to his requirements." Wallace was really making two points here: firstly, that – to judge by comparative brain size – certain forms of human intellectual and moral activity had become possible well before human culture had developed a capacity to take advantage of them; and, secondly, that the life of "savage man" was insufficiently removed from the conditions of earlier brutal survival to account for the brain's development upon the principle of selective advantage. The development of the human brain, then, was physically unnecessary and had been directed to the subsequent development of intellectual and moral (or "spiritual") human being.<sup>50</sup> Huxley responded by noting "that nothing can be more admirable than ... what a savage has to learn ... that every time a savage tracks his game he employs a minuteness of observation, and an accuracy of inductive and deductive reasoning which ... would assure some reputation to a man of science...." Huxley was speaking past the point, however, since Wallace had not denied the accomplishments of modern-day

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<sup>50</sup> *CE II*, pp. 174.



savages generally. Rather, Wallace had cited several modern instances of savage tribes that “pass their lives [exercising] few faculties not possessed ... by many animals,” reasoning that the lives of the earliest savages would have been no less brutal. The higher accomplishments of modern savages, in other words, were a part of Wallace’s contention, not an exception: it seemed that savage intellects were inherently capable of much more than had been necessarily to their benefit. Huxley then added, “...suppose, for the sake of argument, that a savage has more brains than seems proportioned to his wants, all that can be said is that the objection to natural selection, if it be one, applies quite as strongly to the lower animals. The brain of a porpoise is quite wonderful for its mass, and for the development of the cerebral convolutions. And yet ... [it is] difficult to imagine that their big brains are only a preparation for the advent of some accomplished cetacean of the future.” The impossibility of saying how deeply into natural history these objections to natural selection may go was a point against Wallace.<sup>51</sup>

Huxley also addressed Wallace’s claim that certain characteristically human mental faculties were impossible to explain as the gradual accumulation of variations benefiting earlier savage individuals or societies. The inexplicable faculties included abstract reason, ideal conception, formal artistic sensibility, and formal mathematical facility. Huxley replied that such things had benefited individuals within more advanced societies.

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<sup>51</sup> *CE II*, pp. 174-77.

...The lowest savages are as devoid of any such conceptions as the brutes themselves. What sort of conceptions of space and time, of form and number, can be possessed by a savage who has not got so far as to be able to count beyond five or six...? None of these capacities are exhibited by men, unless they form part of a tolerably advanced society. And, in such a society ... a selective influence is exerted in favour of ... the possession of these capacities.

The savage who can amuse his fellows by telling a good story ... [or] carve ... the figure-head of a canoe ... profits beyond his duller neighbour. He who counts a little better than others, gets most yams.... The experience of daily life shows that social existence exercise[s] the most extraordinarily powerful selective influence in favour of novelists, artists, and strong intellects of all kinds; and it seems unquestionable that all forms of social existence must have had the same tendency, if we consider the indisputable facts that even animals possess the [rudiments of intelligence]....

Huxley has not specified, however, whether his first exemplary savages were devoid of advanced conceptions or of the capacity for conceptions of that kind: whether, in other words, they had not yet applied themselves to carving a good figure or were incapable of imagining one. Moreover, he assumes that societies will select for intellectual qualities that may be dispersed among individual members, but he does not specify any selective benefit to the society. There is no reason for any society to select for the benefit of an individual. The problems were not avoided, certainly, by discovering them in animals, as well.<sup>52</sup>

The point is not to sustain Wallace's objections to natural selection, of course, but to note their perplexity, and that Huxley took them seriously as Darwinian problems. Huxley could be somewhat mocking of Wallace's logic – "if Mr. Wallace's doctrine holds good, a higher power must have superintended the

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<sup>52</sup> *CE II*, pp. 177-79.

breeding up of wolves from some inferior stock, in order to prepare them to become dogs” – but he did not prohibit its scientific notice.<sup>53</sup> Although Huxley was skeptical of superintendence as a contribution to physical science, his scientific positivism was not so far advanced that, at any time after publication of the *Origin*, he ever banned superintendental reasoning from the pale of natural philosophy.

Moreover, this was not a great change from Huxley’s public appreciation of earlier superintendental contributions to science. When first apologizing for Darwin and the *Origin*, as noted in Chapter Five, Huxley had distinguished superintendental explanations of natural history that had a basis in science from others that were theologically premised. It may be, in fact, that there is no appreciable difference of tone or judgment between Huxley’s treatment of special creations and geological catastrophes in 1860, and his treatment of Wallace in 1871. If there is a difference, however, it is all in favor of the scientific standing of Wallace. Undoubtedly, this may be explained by the close association of Wallace with natural selection and Darwinism. That, however, is precisely the point: Wallace was a Darwinian superintendentalist, and he was considered as such by Huxley.

The decades-long tradition of superintendental natural theology in Britain, which must be properly distinguished from the utilitarian natural theology of Paley, as well as from the developmental teleology of *Vestiges*, was, if anything,

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<sup>53</sup> *CE II*, pp. 176-77.

more deeply integral to Darwinism than it had been to the earlier natural history of catastrophes and special creations. Wallace, as the co-originator of the theory of natural selection, quintessentially reminds us that Darwin's initial metaphor – selectively breeding fancied pigeons – was actually superintendental, not utilitarian or developmental. There was no utility to the forms of fancied pigeons – as noted above, Darwin had made that point to Gray – and no equivalent to the pigeon fancier may be found in the progress of embryological development. The post-Darwinian logic of "guided" evolution, then, whenever it was found in the thought of Darwinians such as Wallace and Gray, was not simply a failure to appreciate how thoroughly Darwin had foreclosed upon the categories of utilitarian design and embryological development within evolutionary science; rather, it was adherence to the superintendental bases of Darwinian thought.

This important fact has been obscured from historical appreciation, firstly, by the now discredited association of Darwin with the developmental logic of *Vestiges*; and, secondly, by the ongoing historiographical failure to distinguish superintendence from supernatural intervention and utilitarian special creation in nineteenth-century natural philosophy and natural theology. Possibly, the long confusion of superintendence with intervention has made it impossible for historians to see superintendence within science. Nonetheless, within the science of natural selection, considered as an aspect of natural historical design argument and exemplified by Wallace and Gray no less than by Darwin, the logic of either designed utility or embryological development ultimately played very

little part. When these men spoke of evolutionary “development,” they had something more closely associable with superintended progress in mind. Remarkably, this is true no less of Darwin than of Wallace, even though Darwin had worked toward natural selection by distancing himself from Paley and the logic of utilitarian natural theology, while the younger, more radical Wallace had distanced himself from *Vestiges* and the logic of embryological development.

It is impossible not to notice, then, that Huxley’s deterministic understanding of evolution was not characteristic of Darwinian thought. As noted at this chapter’s outset, Huxley understood evolution in terms of linear material determinism; and, although he seemed unconcerned to distinguish the determinism of organic development from that of atomistic mechanics, material determinism in any form is incompatible with superintendence.

It is important to remember, however, that Huxley’s evolutionary determinism was teleological – it progressed in a definite direction as if designed to do so. What Huxley’s evolutionary thought disallowed was not teleology and design, but superintendence. Remarkably, this identical point of contention had stood at the heart of natural theological debate since at least 1830, when the uniformitarianism of Lyell’s *Principles of Geology* challenged the catastrophism of Buckland and Whewell. Moreover – as we saw in Chapters Three, Four, and Five – the desire to exclude superintendence from science had been implicitly basic to Huxley’s criticisms of design arguments since at least the early 1850s.

It is very significant, then, to find the rejection of superintendence made explicit in Huxley's public debate with Wallace – a fellow Darwinian – in 1871. It means that Huxley was more explicitly engaged with superintendential thought as a Darwinian than he had been previously. Of course, Wallace – unlike the earlier superintendentalists – had invited Huxley to consider superintendence as a matter of science, not of natural theology, and that made a great difference because, as we determined in Chapter Four, the attempt to consider natural theology only in scientific terms had figured significantly into Huxley's defense of *Origin of Species*. Also, Huxley continued to reject superintendence – previously implicitly, now explicitly.

Nonetheless, if we accept that Huxley was in some sense a Darwinian, then we may permissibly include material determinism with superintendence as categories of nineteenth-century Darwinian teleological thought. It is only by defining Darwinism as the attempt to explain natural history exclusively by random variation (in Darwin's sense of that phrase) and natural selection that historians may doubt the forms of teleology that clearly persisted within nineteenth-century Darwinism. Measured against that exclusive standard, however, not even Darwin was always a true Darwinian.

Very remarkably, however, to include Huxley among the representatives of Darwinian teleology does not secure but renders very problematic any further role for natural theology within Darwinian science. As a form of material determinism, Huxley's teleology foreclosed upon the possibility of

superintendential natural philosophy and natural theology. As we saw in Chapters Two and Three, superintendence, following its introduction into British natural philosophy by Buckland in 1819 and its philosophical systematization by Whewell in the 1830s, had engaged theism by allowing, within the context of a design argument, that there may be non-physical explanations for natural history and non-uniform explanations for the order of nature. Throughout his scientific life, Huxley had been constantly antagonistic to any suggestion of superintendence within science. Prior to the publication of *Origin of Species*, this antagonism had remained largely implicit to his thought. In his defense of *Origin*, however, Huxley necessarily began to engage superintendential thought as an aspect of science – even though, at the same time, he misleadingly encouraged the association of Darwinism with earlier natural histories of uniformity and development. In 1871, by arguing explicitly against the Darwinian superintendentialism of Wallace, Huxley was at last directly engaging the debate between superintendence and uniformity that had given nineteenth-century natural theology its life in Britain. Huxley was, however, the epitome of the new professionalism in science. By engaging Wallace in debate over superintendence as a point of science, as well as by sustaining objections to superintendence from within science, Huxley was strongly encouraging the drift of natural theology out of theological and into scientific discourse.

Of the three forms of Darwinian teleology studied in this chapter, only Gray's remained a natural theology in the originally recognizable form of a design

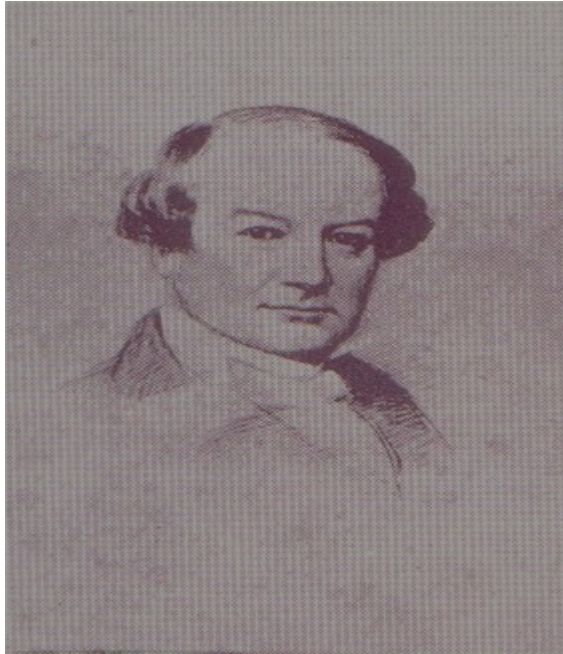
argument set into the context of a larger theology. This confused contextualization is of more than semantic notice, of course, even though it may be difficult to know what to do about the meaning of “theology” if natural theology and religious theology had become exclusive discourses. The deepest confusion was not about definitions, however. Rather, it lay within the whole intellectual and social endeavor, from 1818 until sometime later, to make the Anglican establishment into something comprehensively scientific. By 1870, the radical free-thinker Wallace remained a superintendential natural philosopher but had suggested no reason why a superintendential design argument should imply religious credence; and, in responding to Wallace, Huxley showed himself finally determined to rebut superintendence explicitly and entirely. Gray, however, even in 1876, continued to see Darwinism speculatively as an aspect of the theistic superintendence of natural history. Moreover, to the (perhaps limited) extent that superintendence remained a characteristic way of understanding Darwinian problems, Gray’s speculation was not as peripheral to science as we might expect. Indeed, it may be that the standing of Wallace and Gray as “Darwinians” is adequate to a consideration of superintendential thought as an aspect of nineteenth-century Darwinism.

We may conclude, then, that Darwinism was very much a continuation of the nineteenth-century’s conceptual debate between superintendence and uniformity in explanation of the direction of natural history – a debate that was coterminous with the revival and importance of natural theology in Britain at that



time. This may be added to our earlier conclusion that the social note or authority of Darwinism, especially in controversy with religion, had followed from the importance of natural theology in Britain, as well. Taken together, this arrives at the point of my dissertation: natural theology was not opposed to or ended by Darwinian science; rather, natural theology became an aspect of scientific and no longer of theological discourse by arriving at its theological term within the history of nineteenth-century Darwinian thought. It is important for more historians to recognize that Darwinian science was as much a late episode in the history of British natural theology as it was an early episode in the history of secular and professional science. Any acceptable understanding of the relative importance of science and religion in the social and public life of Britain and, in all probability, the United States, will depend upon it.

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**Baden Powell**

*The stability of natural theology rests upon the demonstration of physical truth; and upon the assurance of ... natural theology must ... all notions of a revelation be essentially founded.*" – The Reverend Baden Powell (1796–1860), MA, FRS, FRGS, Savilian Professor of Geometry at the University of Oxford

*"These parsons are so in the habit of dealing with the abstraction of doctrines as if there was no difficulty about them whatever ... that they gallop over the [science] course ... as if we were in the pews and they in the pulpit. Witness the self-confident style of Baden Powell."* – Sir Joseph Dalton Hooker (1817-1911), GCSI, OM, FRS, MD, Director of the Royal Botanical Gardens.

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