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A PHYSICIST'S ALTERNATIVE TO MATERIALISM: THE RELIGIOUS THOUGHT OF GEORGE GABRIEL STOKES*

THERE WERE FEW MATERIALISTS IN VICTORIAN BRITAIN, BUT MATERIALISM nevertheless seemed a considerable threat to late Victorian Christianity. John Tyndall, speaking in 1874 from that pulpit of Victorian science, the presidency of the British Association for the Advancement of Science, gave an expanded and more controversial account of the "scientific materialism" he had advocated to the association six years earlier.[1] He supported his position with Charles Darwin's theory of evolution and the doctrine of the conservation of energy. Though even Tyndall stopped short of a totally materialistic explanation of the "why" of life, niceties of distinction were easily lost in a time of militant agnosticism and growing emphasis on naturalistic explanations in science.[2] Even if noticed, Tyndall's nod toward the "immovable basis of the religious sentiment in the nature of man"[3] could offer little comfort to the traditional Christian, for it reduced the richness of Christianity to mere feeling in an essentially material world. Moreover, the Christian, living in a society in which urban masses avoided churches in large numbers and in which the privileged position of clergymen was being challenged by an ever-strengthening

* I am grateful to the Syndics of the Cambridge University Library for permission to publish passages from manuscript material, especially from the Stokes Collection, Add. Mss. 7656. For a description of that collection, see D. B. Wilson, *Catalogue of the Manuscript Collections of Sir George Gabriel Stokes and Sir William Thomson, Baron Kelvin of Largs in Cambridge University Library* (Cambridge: Cambridge University Library Press, 1976). Research for the paper was assisted by the Mechanical Engineering Department, Iowa State University.

[1] "Scientific Materialism" is the title Tyndall gave to the reprint of his 1868 address in his *Fragments of Science*, 2 vols. (New York: P. F. Collier & Son, 1902), II, 82-98. His more famous address of 1874 was reprinted simply as "The Belfast Address" in *Fragments of Science*, II, 145-214. Untitled, the two addresses are in *Report of the British Association for the Advancement of Science* (1868), part 2, pp. 1-6, and (1874), pp. lxvi-xcvii.

[2] T. H. Huxley, for example, espected one of his essays, in which he carefully distinguished his position from materialism, to be attacked as "gross and brutal materialism" (Huxley, "On the Physical Basis of Life," in *Method and Results* [London: Macmillan, 1894], p. 154. The essay dates from 1868.) In a note added to the essay in 1892, Huxley wrote that "I cannot say I have ever had to complain of lack of hostile criticism; but the preceding essay has come in for more than its fair share of that commodity" (p. 165).

[3] Tyndall, *Report of the British Association* (1874), p. xcv.

community of scientists, could not help but feel that any move away from traditional Christianity toward agnosticism or materialism was only being hastened by social realities. The late Victorian religious establishment had to worry about evangelizing the working classes and defending its own place in society, while also contending with an outburst of new ideas, none more unwelcome than Tyndall's.[4]

A highly prominent scientist, George Gabriel Stokes was, in addition, an outspoken member of that religious establishment, naturally concerned with evangelizing non-Christians and answering questions posed by modern science and scholarship. Stokes (1819-1903) graduated from Cambridge University in 1841 as senior wrangler in the mathematical tripos and during the next decade or so published research in hydrodynamics and optics that established him as one of the three or four leading physicists of his generation. His work in hydrodynamics was credited with making that discipline into "an ordered mathematical and experimental theory."[5] In optics he investigated problems facing the recently established wave theory of light, and his discovery of fluorescence earned him the Rumford Medal of the Royal Society of London in 1852. He was elected Lucasian professor of mathematics at Cambridge in 1849, holding the chair until his death, and in 1851 gained membership in the Royal Society, which he served as secretary for three decades and as president from 1885 to 1890. In 1898 Lord Kelvin declared that "Sir George Stokes has in my opinion higher claims for the award of the Helmholtz Medal [of the Royal Academy of Sciences, Berlin] than any other physicist or mathematical physicist who has given his work to the world in the English language."[6] Conservative in religion, Stokes maintained extensive correspondence with clergymen and frequently spoke publicly on religious topics. As its president, he often addressed the Victoria Institute, a society founded in the 1860s to combat the influence of *Essays and Reviews* and the *Origin of Species*. He was several times invited to address annual meetings of Church Congresses. As a well-known religious scientist, he was selected in the 1880s to be the first Burnett lecturer in Aberdeen and in the 1890s to deliver the Gifford Lectures in Edinburgh. Unexceptional in the 1840s, his religious views were exceptional by the 1890s.[7]

Victorian scientists' religious thought is becoming much better understood. Long gone is the time when one could regard Victorian scientists simply as non-religious opponents of religion. Gone also is the time when one could be content merely with pointing out that many scientists were Christians. There now exist numerous studies exploring the nature and influence of scientists' religious thought. One thinks of Robert M. Young's discussion of the "common context" of biological, social, and theological discourse, or of Michael Ruse's division of scientists into liberal, centrist, and conservative camps, or of Frank M. Turner's group residing "between science and religion."[8] There are also studies of such scientists as Darwin, Sir Charles Lyell, Michael Faraday, P. G. Tait, Lord Kelvin, and James Clerk Maxwell.[9] However, scholars have paid more attention to biologists and geologists than to physical scientists and more to late Victorian doubters than to

[4] For discussions of the variety of religious controversy in Victorian Britain, see Maurice Mandelbaum, *History, Man, & Reason: A Study in Nineteenth-Century Thought* (Baltimore: Johns Hopkins University Press, 1971), pp. 20-37; Owen Chadwick, *The Victorian Church*, 2 vols. (New York: Oxford University Press, 1966-1970); Bernard M. G. Reardon, *From Coleridge to Gore: A Century of Religious Thought in Britain* (London: Longman, 1971); G. Kitson Clark, *The Making of Victorian England* (London: Methuen, 1965); J. W. Burrow, "Faith, Doubt, and Unbelief," in Laurence Lerner, ed., *The Context of English Literature: The Victorians* (New York: Holmes and Meier, 1978), pp. 153-173; Josef L. Altholz, "The Warfare of Conscience with Theology," in his edition of *The Mind and Art of Victorian England* (Minneapolis: University of Minnesota Press, 1976), pp. 58-77; Martin J. S. Rudwick, "Charles Darwin in London: The Integration of Public and Private Science," *Isis*, 73 (1982), 186-206; Jack Morrell and Arnold Thackray, *Gentlemen of Science: Early Years of the British Association for the Advancement of Science* (Oxford: Clarendon Press, 1981), especially pp. 224-245; Frank M. Turner, "John Tyndall and Victorian Scientific Naturalism," in W. H. Brock, et al., eds., *John Tyndall: Essays on a Natural Philosopher* (Dublin: Royal Dublin Society, 1981), pp. 169-180; and K. S. Inglis, *Churches and the Working Classes in Victorian England* (London: Routledge and Kegan Paul, 1963).

[5] Joseph Larmor, "Stokes, Sir George Gabriel, first baronet (1819-1903)," *Dictionary of National Biography*.

[6] Lord Kelvin to Arthur Julius Georg Friedrich von Auwers, 22 October 1898, Glasgow University Library, Kelvin Papers, LB5/168. Stokes received the Helmholtz Medal in 1901. I am grateful to the Court of Glasgow University for permission to publish this letter.

[7] For biographical material on Stokes, see Lord Rayleigh, "Sir George Gabriel Stokes, Bart., 1819-1903," *Proceedings of the Royal Society of London*, 75 (1905), 199-216; Lord Kelvin, "The Scientific Work of Sir George Stokes," in Kelvin, *Mathematical and Physical Papers*, 6 vols. (Cambridge: Cambridge University Press, 1882-1911), VI, 339-344; Joseph Larmor, ed., *Memoir and Scientific Correspondence of the Late Sir George Gabriel Stokes*, 2 vols. (Cambridge: Cambridge University Press, 1907); and E. M. Parkinson, "Stokes, George Gabriel," in *Dictionary of Scientific Biography*, vol. 13 (New York: Charles Scribner's Sons, 1976), 74-79.

[8] Robert M. Young, "Malthus and the Evolutionists: The Common Context of Biological and Social Theory," *Past and Present*, no. 43 (1969), 106-145; Michael Ruse, "The Relationship between Science and Religion in Britain 1830-1870," *Church History*, 44 (1975), 505-522; and Frank M. Turner, *Between Science and Religion: The Reaction to Scientific Naturalism in Late Victorian England* (New Haven: Yale University Press, 1974).

[9] See, for example, Maurice Mandelbaum, "Darwin's Religious Views," *Journal of the History of Ideas*, 19 (1958), 363-378; Dov Ospovat, *The Development of Darwin's Theory: Natural History, Natural Theology, and Natural Selection, 1831-1859* (Cambridge: Cambridge University Press, 1981); Martin J. S. Rudwick, "The Strategy of Lyell's *Principles of Geology*," *Isis*, 61 (1970), 4-33; Michael Bartholomew, "Lyell and Evolution: An Account of Lyell's Response to the Idea of an Evolutionary Ancestry for Man," *British Journal for the History of Science*, 6 (1973), 261-303; David Gooding, "Empiricism in Practice: Teleology, Economy, and Observation in Faraday's Physics," *Isis*, 73 (1982), 46-67; P. M. Heimann, "The *Unseen Universe*: Physics and the Philosophy of Nature in Victorian Britain," *British Journal for the History of Science*, 6 (1972), 73-79; D. B. Wilson, "Kelvin's Scientific Realism: The Theological Context," *The Philosophical Journal*, 11 (1974), 41-60; Joe D. Burchfield, *Lord Kelvin and the Age of the Earth* (New York: Science History Publications, 1975), pp. 47-50; Crosbie Smith, "'Natural Philosophy and Thermodynamics: William Thomson and "The Dynamical Theory of Heat,'" *British Journal for the History of Science*, 9 (1976), 293-319; and P. M. Heimann, "Molecular Forces, Statistical Representation and Maxwell's Demon," *Studies in History and Philosophy of Science*, 1 (1970), 189-211.

their religious colleagues. In fact, Stokes, the most public religious scientist of that era, has received only brief notice. By focusing on Stokes's religious thought, therefore, this paper deals with relatively neglected aspects of Victorian scientists' religious views and their place within the nineteenth-century framework of issues.

Previous discussions, though brief, have at least signaled Stokes's significance. He has been noted as an "exhibit" which beleagered Victorian Christians could use in their cause (Chadwick, *The Victorian Church*, II, 6). He has been pointed to as an exponent of "dualistic idealism" in contrast to the agnosticism and materialism of some of his contemporaries.[10] His opposition to the doctrine of eternal torment has led him to be described as the main scientific proponent of the doctrine of conditional immortality.[11] Going beyond such comments, this paper examines the context and content of Stokes's religious thought. The first section describes the shaping of his overall religious viewpoint; the next two concentrate on the areas attracting most of his attention — espousal of the doctrine of conditional immortality and opposition to an extreme view of biological evolution. Though both these areas involved the rejection of materialism, it is the paper's final section which examines Stokes's concept of "directionism," attempting to show how the various aspects of his thought contributed to this his specific alternative to materialism.

I

Stokes's religious views combined Evangelical Christianity both with some of William Paley's ideas and those of certain critics of Paley at Cambridge. The Evangelical movement was the vital element in early nineteenth-century British religion. Crossing denominational lines, it swelled membership in Anglican and dissenting churches. Unlike high-church Anglicanism, Evangelical Anglicanism leaned not toward Catholicism and the upper classes, but toward dissent and the lower classes. Unlike high-church or liberal Anglicanism, it was noted for neither sophisticated theological argument nor a historical and

[10] Noel G. Coley and Gerrylynn K. Roberts, "Scientists and the Spiritual World," in *Science and Metaphysics in Victorian Britain* (Milton Keynes: The Open University Press, 1981), pp. 42-44.

[11] Geoffrey Rowell, *Hell and the Victorians: A Study of Nineteenth-Century Theological Controversies Concerning Eternal Punishment and the Future Life* (Oxford: Clarendon Press, 1974), p. 204.

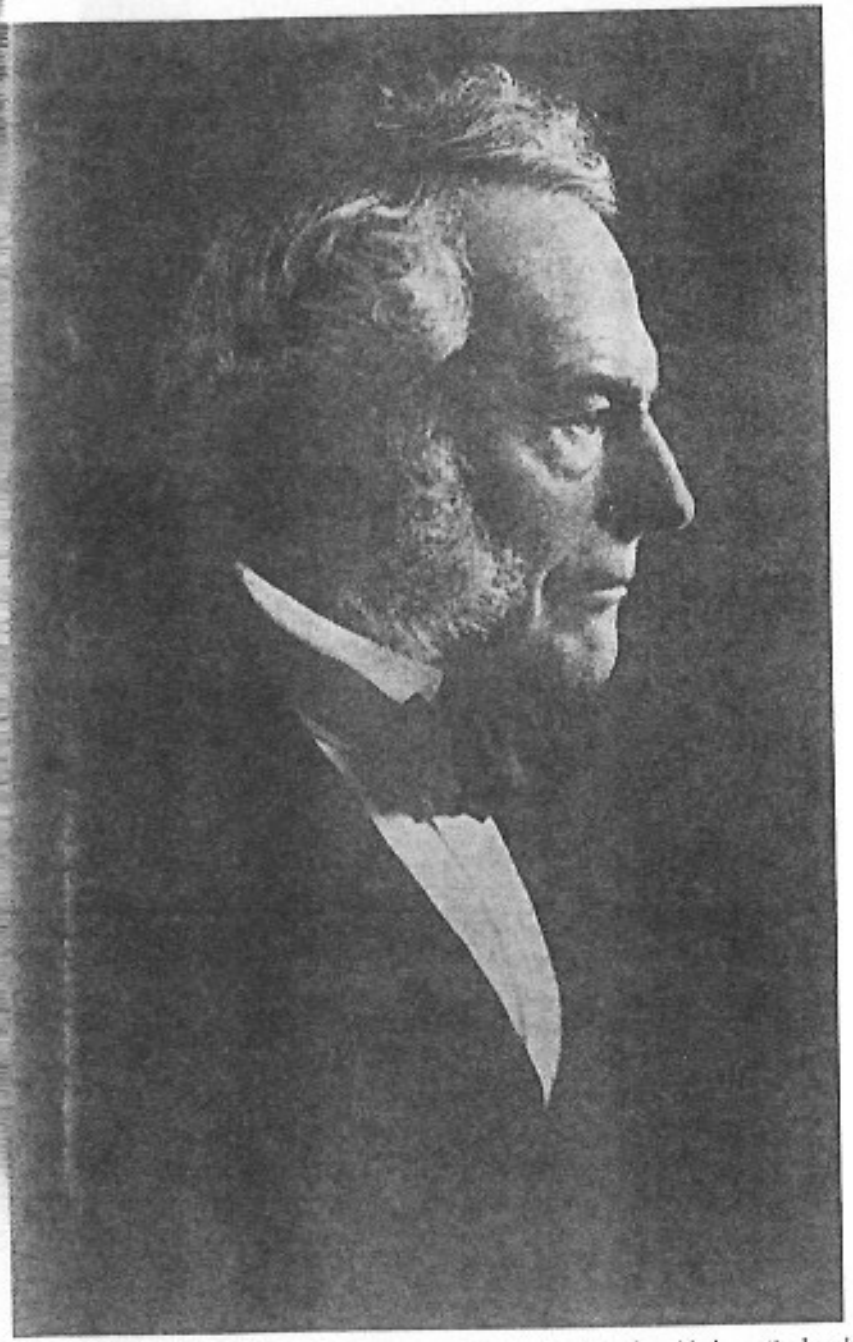
scholarly approach to the Bible. Rather, Evangelicals emphasized emotional attachment to Christianity, earnestness of religious purpose, close attention to Scripture, and deep concern for the doctrine of Atonement with the attendant threat of eternal punishment for the unsaved. To save those so threatened, they enthusiastically evangelized for their version of Christianity, founding, for example, the Church Missionary Society in 1799 and the British and Foreign Bible Society in 1804. Two centers of Evangelical Anglicanism were Clapham, where the Clapham Sect resided, and Cambridge University. At Cambridge, Evangelicals occupied important university positions and were led by Charles Simeon, a 1783 Cambridge graduate, vicar of Holy Trinity Church in Cambridge from 1783 until his death in 1836, and one of the founders of the Church Missionary Society. In 1856 at least 247 undergraduates regarded themselves as Evangelicals.[12]

Prevailing religious views at Cambridge, however, had more to do with William Paley than with Evangelicalism. All three of his chief works (*Natural Theology*, *Evidences of Christianity*, and *Moral Philosophy*) received wide attention at Cambridge, the latter two being required for Cambridge examinations.

Paley's mutually reinforcing *Natural Theology* and *Evidences* rejected David Hume's arguments against the design argument and the reality of miracles. Paley discussed numerous examples of design in a watch-like universe and confidently proclaimed the existence of a one, good, designing God. Furthermore, "once believe that there is a God, and miracles are not incredible." Miracles constituted the primary evidence for the truth of Christianity. Where Hume saw unreliable testimony for the reality of miracles, Paley spoke of the "probity and good sense" of the witnesses to Christ's miracles and of the hardships they endured as they sought to spread His message.[13] Their willingness to suffer for what they preached helped demonstrate the truth of Christianity. "Auxiliary evidences for Christianity," according to Paley, included Biblical prophecy, the high morality of the gospels, the candor of the writers of the New Testament, the originality of Christ's character, and the agreement of the four gospels on the nature of

[12] Chadwick, *The Victorian Church*, I, 447. See D. A. Winstanley, *Early Victorian Cambridge* (Cambridge: Cambridge University Press, 1955), pp. 18-28, and Standish Meacham, *Lord Bishop: The Life of Samuel Wilberforce, 1805-1873* (Cambridge, Massachusetts: Harvard University Press, 1970), pp. 12-13, where he notes Wilberforce as an exception to the Clapham pattern of sending their sons to Cambridge.

[13] William Paley, *A View of the Evidences of Christianity* in *The Works of William Paley* (London: Jennings and Chaplin, 1834), p. 6.



George Gabriel Stokes about 1892, age about 73. From G. G. Stokes, *Mathematical and Physical Papers* (Cambridge: Cambridge University Press, 1905), V, frontispiece. "Copyright from life by Mrs. F. W. H. Myers, 1892."

Christ's character. As one well-known Cambridge graduate of the 1820s summarized his and doubtlessly many others' reaction to Paley's books: "I am convinced that I could have written out the whole of the *Evidences* with perfect correctness, but not of course in the clear language of Paley. The logic of this book and as I may add of his *Natural Theology* gave me as much delight as did Euclid."[14]

Paley's *Moral Philosophy*, however, though a required part of the examination for a pass degree, did not give quite the same "delight" as his other books. Paley presented a utilitarian morality later summarized by Leslie Stephen: "Christ came to tell us that we should go to hell if our actions did not tend to promote the greatest happiness of the greatest number."[15] During the 1830s, Paley's ideas were challenged by Adam Sedgwick and William Whewell, both of whom asserted that morality rested on a divinely implanted, innate sense of right and wrong. Whewell thought that Man could recognize his innate conscience either with or without the aid of revelation. Citing Romans for support, he wrote that all men "have within them a voice which accuses and condemns them. God has established in their bosoms a power which tries, judges, punishes and rewards their most secret actions."[16]

One could hardly avoid encountering the views of Sedgwick and Whewell in early Victorian Cambridge. Sedgwick's *Discourse on the Studies of the University* appeared first in 1833 and reached its fourth edition in 1835.[17] Whewell, who held the professorship of moral philosophy from 1838 to 1855, published many works on moral philosophy in the 1830s and 1840s, including *On the Foundations of Morals*, "four sermons preached before the University of Cambridge in November 1837." In November 1837 Stokes was a new Cambridge undergraduate, and the first four University sermons he attended were these by Whewell attacking Paley's moral philosophy.[18]

Stokes came to the ideas of Paley and Whewell from his youthful background in Evangelical Christianity. Stokes's father was the rector

[14] Charles Darwin, *The Autobiography of Charles Darwin, 1809-1882*, ed. Nora Barlow (New York: W. W. Norton, 1969), p. 59.

[15] Leslie Stephen, *History of English Thought in the Eighteenth Century*, 2 vols. (New York: Harcourt, Brace & World, 1962), I, 353. Quoted with approval in M. L. Clarke, *Paley: Evidences for the Man* (London: Society for Promoting Christian Knowledge, 1974), p. 72.

[16] William Whewell, *On the Foundations of Morals*, four sermons preached before the University of Cambridge in November 1837 (Cambridge and London, n.d.), p. 19.

[17] Adam Sedgwick, *A Discourse on the Studies of the University*, 4th ed. (Cambridge: J. Smith for J. and J. J. Deighton, 1835).

[18] Stokes's notes on the sermons are in the Stokes Collection, PA36.

of Skreen, County Sligo, and Stokes's three older brothers also became Anglican clergymen. Commenting on Stokes's childhood, the vicar of the church in Cambridge where Stokes had long been church warden declared:

> Though he was never narrow in his faith and religious sympathies, he always held fast by the simple evangelical truths he learned from his father, the Protestant rector of Skreen, in the county of Sligo.
>
> He several times gave me interesting details of his early years. In his case certainly "the child was father of the man"; for he soon became deeply thoughtful about religious matters, whilst he quickly developed indications of his remarkable mental powers.
>
> "I recollect," he once wrote, "when I was a little child being so horrified at the idea of endless torments that I wished there was no God and no future state, lest I should fall into them. No doubt (he continued) all children are naughty more or less, but I don't think I was what would be called a naughty child as children go, perhaps rather the reverse. Perhaps my mind being naturally of a mathematical turn, I took in the idea of infinite duration more readily than most children would have done."[19]

In adulthood, Stokes agreed to be vice-president of the Evangelical British and Foreign Bible Society in 1891 and took part in its meetings.[20] He was active in the affairs of the Church Missionary Society and wrote on doctrinal matters relevant to missionary work.[21] Perhaps even his supreme conscientiousness in pursuing his duties as secretary of the Royal Society and in corresponding with those seeking advice reflected an Evangelical seriousness of purpose.[22] Said his vicar: "It was the fact that Sir George's character rested upon his religious faith, that we of this parish are witnesses of more than others."[23]

Stokes's writings on religion reflect an Evangelical approach. Though he disagreed with the usual Evangelical view of eternal punishment, for example, he did so in typical Evangelical fashion, through close argument from Scripture. Indeed, despite his interest in Paley and Whewell, the foundation of his religious views was the Bible, not philosophical or theological deliberations. That was why he found

[19] H. P. Stokes, "Reminiscences of Sir George Stokes," *Cambridge Chronicle* (13 February 1903). The quotation from Stokes is in G. G. Stokes, *Conditional Immortality: A Help to Sceptics* (London: James Nisbet & Co., 1897), pp. 28-29.

[20] H. P. Stokes, "Reminiscences of Sir George Stokes," reports on remarks made by Stokes to a meeting of the British and Foreign Bible Society in Oxford in 1897.

[21] For example, he wrote that polygamists converted to Christianity should be allowed to remain polygamists. G. G. Stokes, "On Polygamy in Connection with Christian Missions," reprint from the *Churchman* contained in the Cambridge University Library.

[22] Michael Foster, Stokes's fellow secretary at the Royal Society, wrote, "It has been painful to see how his energy has been wasted in this way" (Foster to Lady Rayleigh, 1884, in Robert John Strutt, Fourth Baron Rayleigh, *Life of John William Strutt, Third Baron Rayleigh* [Madison: University of Wisconsin Press, 1968], p. 168).

[23] H. P. Stokes, "Reminiscences of Sir George Stokes."

his twenty Gifford Lectures on natural theology so onerous a task. Forbidden by Lord Gifford's will to bring revealed religion into the discussion, Stokes apologized to his audience for what he regarded as the inadequacies of his lectures. In his own life, he stated, "I have gone on the basis of accepting a supernatural revelation, more especially on that of accepting the resurrection of Jesus of Nazareth as a supernatural historical fact. I have never written on, and I may add I have never specially studied, natural theology or moral philosophy."[24] Though Stokes's most fundamental views thus relied more on an intimate knowledge of Scripture than on philosophical-theological contemplation, nevertheless, his thought did bear the imprint of Paley and Whewell to a significant extent.

As had Paley, for example, Stokes declared: "Admit the existence of a God, of a personal God, and the possibility of miracle follows at once" (Stokes, *Natural Theology*, I, 24). He also agreed with Paley in noting the importance of the honesty of the narrative and the character of Jesus as evidence of the Bible's truthfulness. At the least, the New Testament could be regarded "as honestly-written narratives, not exempt from such errors in small details as an ordinary historian, however honest and painstaking, might fall into" (Stokes, *Conditional Immortality*, p. 81). The narrative described a man of high character, and such a man could not commit the blasphemy of falsely claiming to be the Son of God (pp. 63-65). But as well as an *Evidences* concern for the "head," Stokes displayed an Evangelical concern for the "heart":

> The admission of the resurrection of Jesus Christ, if regarded as a dry isolated fact, would I think be of little or no value. It seems to have been God's *design* that it should *not* be so regarded. We read, "God raised him from the dead and showed him openly, *not unto all the people*, but unto witnesses chosen afore of God." Were admission of the fact of the resurrection the one important thing, the obvious way (if one may so speak without irreverence) to secure it would have been to have shown Him openly. The evidence for the resurrection of Jesus Christ is never to be separated from a consideration of the character and teaching and works of Jesus Christ. The head and heart must go together.[25]

As Stokes said, he had written little on natural theology before his first set of Gifford Lectures in 1891. Nowhere, not even in the Gifford Lectures themselves, did he examine the general philosophical underpinning of the design argument or attempt, for example, to answer David Hume's specific objections to it. He clearly did accept and use the argument, however, and left no doubt that he agreed with

[24] G. G. Stokes, *Natural Theology: The Gifford Lectures*, 2 vols. (London: Adam and Charles Black, 1891-1893), I, 270. See also I, 187, and Larmor, ed., *Memoir and Scientific Correspondence*, I, 17-80. See Stokes, *Natural Theology*, II, 215-222, where he discusses Christ's character based on the gospels "regarded as simple history."

[25] Stokes to A. H. Tabrum, 5 October 1899, in Larmor, ed., *Memoir and Scientific Correspondence*, I,

Paley: "I regard [design] much in the same way that was mentioned long ago by Paley in his *Natural Theology*, when he spoke of the difference between a man's impression in picking up a stone on a common and in picking up a watch."[26]

Whewell was, likewise, Stokes's main authority for moral philosophy. In his first series of Gifford Lectures, he rejected utilitarian morality, which only had a "very limited application," in favor of the "school of moralists [who] hold that we have an innate consciousness of right and wrong" (Stokes, *Natural Theology*, I, 227-228). Like Whewell, he said that although the mental faculties involved in moral philosophy differed from those employed in geometry and physics, they still were "natural powers of the mind" (I, 224). Like Whewell, Stokes compared the "first principles of right and wrong" to the axioms of geometry and argued that, though feelings of right and wrong were innate to the mind, they may require "the exercise of some thought to bring them to the surface" (I, 228-229). Hence, though Stokes did not adopt Whewell's Kantian-like theory of knowledge for science, he clearly did do so for moral philosophy.

Indeed, it was in his discussion of Whewellian moral philosophy that Stokes perhaps best summed up his own set of concerns and viewpoints:

> To me it seems to be the simplest to suppose that man's mental powers, as well as his bodily frame, were designed to be what they are. How that design was carried out we have no means of knowing, and it does not concern us to inquire; but, assuming that it was so, I see no difficulty in supposing that man's innate sense of right and wrong was as much impressed upon him, as little the creation of his own will, as his bodily frame. If that be so, we may even look on this innate sense of right and wrong as the will of God written upon the heart, and some rules of guidance may be obtained even without having recourse to a supernatural revelation.
>
> (Stokes, *Natural Theology*, I, 231).

Here there is not only the implication, spelled out by Stokes elsewhere, that such conclusions dovetail with a Scripture viewed in the manner of *Evidences* and Evangelicalism, but also the focusing of Paleyean natural theology and Whewellian moral philosophy on that central religious issue — the nature of Man. It was this issue which dominated Stokes's criticism both of the Christian doctrine of eternal torment and the Darwinian theory of biological evolution.

[26] Stokes's remarks made in the discussion following his address, "On the Bearings of the Study of Natural Science, and of the Contemplation of the Discoveries to which that Study Leads, on Our Religious Ideas," *Journal of the Transactions of the Victoria Institute*, 14 (1880), 227-248. The quotation is on p. 247.

II

The young George Stokes was not the only one unhappy with the doctrine of eternal punishment. At times, it must have seemed likely to become a source of eternal controversy. In 1853 F. D. Maurice reinterpreted the doctrine so that "eternal" did not mean a period of time.[27] He was dismissed from his professorship at King's College, London. In the 1860s great and official Church consternation greeted criticism of the doctrine in *Essays and Reviews* and by Bishop Colenso of Natal in connection with his missionary work. The agnostic Charles Darwin, in his *Autobiography*, written around 1880, called it "a damnable doctrine" and could "hardly see how anyone ought to wish Christianity to be true" (Darwin, *Autobiography*, p. 87). His Christian wife's response was no less hard on the doctrine itself: "Nothing can be said too severe upon the doctrine of everlasting punishment for disbelief — but very few now [1882] wd. call that 'Christianity,' (tho' the words are there)" (p. 87n). The urban masses, their tenuous link to organized religion already documented by the religious census of 1851, began hearing the militant atheism preached by the working-class Secular or Freethought Movement which was formed in the 1850s and peaked in the 1880s.[28] "When Secularists named the Christian doctrines they found most objectionable, they were almost always those of Eternal Punishment, Hell, the Atonement, and Damnation for unbelievers" (Budd, "Loss of Faith," p. 118).

Against this background, the movement for the doctrine of conditional immortality as a replacement for that of endless punishment began in the 1840s and was much discussed during the 1870s (Rowell, *Hell and the Victorians*, pp. 180-207). Most widespread among Congregationalists and Evangelical Anglicans, the view reserved immortality for the saved, condemning the rest to extinction. Though less cruel than eternal torment, extinction retained the sting absent from the "universalist" alternative that everyone would eventually be saved. The doctrine was seen as befitting a kind God who nevertheless expected humans to behave themselves. At first met only with reprobation, conditionalists succeeded well enough to contribute significantly to the well-known, overall changes in Victorian religious thought. At the end of the century, "it is true that the doctrine of hell had not been

[27] F. D. Maurice, "Concluding Essay — On Eternal Life and Eternal Death," in *Theological Essays*, introduction by E. F. Carpenter (London: James Clarke, 1957).

[28] Susan Budd, "The Loss of Faith: Reasons for Unbelief among Members of the Secular Movement in England, 1850-1950," *Past and Present*, no. 36 (1967), 106-107.

removed from the official theological confession of any denomination, but men were no longer deprived of office for teaching a tentative universalism or regarded with suspicion for espousing the doctrine of conditional immortality" (Rowell, *Hell and the Victorians*, p. 212).

Stokes began his mature deliberations on eternal punishment in 1851, his daughter tells us, when he was thirty-two years old.[29] He was possibly influenced by the book *Life in Christ* published in 1846 by Edward White, a Congregational minister who became the leading proponent of the doctrine of conditional immortality.[30] By the late 1860s, Stokes had fully accepted the doctrine,[31] and in the 1870s he was urging the position on others, including his nephew Reverend W. H. Askwith, P. G. Tait, William Walton, and T. T. Perowne.[32] In 1877 he tried but failed to get the London Christian Evidence Society officially to adopt the doctrine of conditional immortality.[33] In that decade he began what became an enormous correspondence with Edward White himself, and White quoted at length from one of Stokes's letters in the preface to his book's third edition in 1878.[34] In the early 1880s Stokes was caught up in a long correspondence on behalf of Walter Dening, a missionary to Japan for the Church Missionary Society who evidently had been preaching conditional immortality too vigorously. In connection with that controversy, Stokes published a pamphlet privately in 1882, which presented three missionaries' favorable reports on the doctrine that had been forwarded to Stokes by White.[35] He wrote to the

[29] Lamor, ed., *Memoir and Scientific Correspondence*, I, 46.

[30] Edward White, *Life in Christ: Four Discoveries upon the Scripture Doctrine that Immortality is the Peculiar Privilege of the Regenerate* (London, 1846).

[31] Stokes, *Conditional Immortality*, p. 19, and G. G. Stokes, "Is the Soul of Man by Its Nature Immortal?" a paper read at Sion College on 20 April 1893, p. 138. I have used a reprint contained in the Cambridge University Library from a journal or magazine I have not identified.

[32] Askwith, a Cambridge graduate of 1867 and a curate in Devon from 1867 to 1874, sharply rejected his uncle's views. (Correspondence from Askwith to Stokes, beginning in 1872, is in the Stokes Collection.) Tait, professor of natural philosophy at Edinburgh, was interested but not convinced, at least not in 1875. (Tait to Stokes, 6 March and 11 March 1875, Stokes Collection, T73 and T74.) Walton, a high wrangler at Cambridge in the 1830s, agreed: "I return to you by this post Constable's Treatise on Future Punishment. The conclusion, at which he arrives, has been my conviction for many years" (Walton to Stokes, 26 June 1874, Stokes Collection, W100.) Perowne, a Cambridge graduate of 1847 and archdeacon of Norwich from 1878 to 1910, disagreed: "In his argument from Holy Scripture, Mr. Constable appears to me completely to break down" (Perowne to Stokes, 30 July 1874, Stokes Collection, P230.) On Constable, see note 40.

[33] P. Barker, secretary of the Christian Evidence Society, to Stokes, 18 May 1877, Stokes Collection, C391.

[34] Edward White, *Life in Christ: A Study of the Scripture Doctrine on the Nature of Man, the Object of the Divine Incarnation, and the Conditions of Human Immortality*, 3d ed. (London: Elliot Stock, 1878), p. vii. This is the third edition of White's book published in 1875, which White regarded as a different book, though with the same basic title, from the one published in 1846. Some 265 letters from White to Stokes are in the Stokes Collection.

[35] G. G. Stokes, *Evidence of Missionaries as to the Practical Effect of Presenting Christianity to the Heathen in the Form Associated with the Doctrine of "Life in Christ,"* (Cambridge: privately printed, 1882).

Church Missionary Society that "if this counsel or this work be of God, ye cannot overthrow it, lest haply ye be found even to fight against God. Ye cannot indeed overthrow it; but how know you but that in the endeavour to stifle it by muzzling the evangelist sent out to the heathen you may be the occasion of preventing the salvation of many a soul for whom Christ died?"[36]

In the 1890s Stokes finally published his own formulations of the doctrine, reflecting views defined by Edward White and others whose works had flourished in the 1870s. One of these was Reverend Henry Smith-Warleigh, whose correspondence with Stokes apparently began with his sending Stokes a copy of his *Hear the Church of England* (1872), which argued that the Church of England had actually rejected the doctrine of eternal punishment.[37] Smith-Warleigh wrote Stokes that "the dogma of endless torments, inflicted by a God of beneficence, has been more fruitful than any other one cause of the growing infidelity and indifference of the myriads of our artizans and even of our educated countrymen."[38] Smith-Warleigh thought White and two others were the only ones in London doing useful teaching against the doctrine of eternal punishment.[39] The others were Reverend Samuel Minton and Reverend Henry Constable, with both of whom Stokes later corresponded.[40] Constable's *Future Punishment* was the book he sent others. Smith-Warleigh may have helped bring White and Stokes together.[41] Their correspondence began in 1875 when White replaced Smith-Warleigh as Stokes's principal correspondent on conditional immortality.

Without attempting a detailed analysis of the differing emphases and opinions contained in the body of literature produced by these men, we can at least identify their primary areas of agreement

[36] Stokes's copy of his letter to Mr. Barton, 12 December 1881, Stokes Collection, B163. Relevant letters on the controversy are scattered through many parts of the Collection.

[37] Henry Smith-Warleigh, *Hear the Church of England which Is Proved to Have Expelled from Her Articles the Dogma of Endless Torments* (London, 1872). Smith-Warleigh to Stokes, 29 June 1872 and 2 April 1873, Stokes Collection, W155 and W176. Smith-Warleigh, of Ashchurch Rectory in Gloucestershire, published other works, including *A Demonstration of the Extinction of Evil Persons and of Evil Things* (London: E. Stock, 1871), one copy of which was ordered by Stokes. (Smith-Warleigh to Stokes, 29 June 1872, Stokes Collection, W155.)

[38] Smith-Warleigh to Stokes, 29 June 1872, Stokes Collection, W155.

[39] Smith-Warleigh to Stokes, 7 May 1873, Stokes Collection, W178.

[40] Minton, an Oxford graduate of 1842, published *The Glory of Christ in the Creation and Reconciliation of All Things* (London, 1868), *The Way Ever-Lasting* (London: Elliot Stock, 1869), and *The Harmony of Scripture on Future Punishment* (London, 1872). These works, "by my friend and fellow-labourer," were praised by White in the third edition of his *Life in Christ*, p. v. Constable, chaplain of the City of London Hospital for Diseases of the Chest, published *The Duration and Nature of Future Punishment* (London: Longmans, Green, & Co., 1868) and *Hades: or the Intermediate State of Man* (London: Elliot Stock, 1873).

[41] Smith-Warleigh to Stokes, 15 November 1875, Stokes Collection, W197.

which Stokes later endorsed. First, truth in these matters depended ultimately on the Bible. "This book rests the question of Immortality wholly on interpretation of Scripture," White wrote (*Life in Christ*, 3d ed., p. iii). "One verse of the Bible on the nature of man, on the source of his life, on the meaning of his death, must outweigh a whole treatise of Plato, Aristotle, or Epicurus." Constable declared (*Hades*, p. 8). Second, the doctrine of conditional immortality was verified by Scripture, whereas neither universalism nor the doctrine of eternal punishment was. Third, the tripartite nature of Man was Biblical; the dual nature of Man was Platonic, and wrong. Fourth, related questions — for example, whether human beings were conscious, alive, and/or evangelized during the intermediate state between death and Judgment — were worth examining, even at length, but in the end were far less crucial than the question of immortality. Hence, theirs was an intricate and exhaustive search of Scripture for truth — a search driven by challenges to Christianity at home and abroad and from all levels of society.

The same search, with its conceptual and social motivations, carried over into Stokes's writings of the 1890s. He presented his views in three publications besides the Gifford Lectures. " 'I,' A Lecture on the Immortality of the Soul" was delivered in 1890 at the Finsbury Polytechnic and published in *The Family Churchman*. *Conditional Immortality: A Help to Sceptics* contained a series of thirteen letters written by Stokes in 1892 to James Marchant, a Christian Evidence Society lecturer in London. Marchant wrote Stokes that publishing these letters "would be the best way of showing the Secularist that the 'orthodox view' is *not* always held by our most eminent scholars."[42] He reported that "after a pretty long experience amongst working men I do not remember more than six persons who had looked at the subject of 'eternal torments' from the position of 'Life in Christ'!"[43] The third publication, "Is the Soul of Man by Its Nature Immortal?," was read at Sion College in 1893. Stokes rested his conclusions above all on Scripture, but also on everyday experience (especially fainting) and scientific knowledge.

As the true counter to the false doctrine of eternal torment, the concept of conditional immortality was Stokes's principal concern.

[42] James Marchant to Stokes, 30 August 1892, Stokes Collection, M303.

[43] Marchant to Stokes, 2 September 1892, Stokes Collection, M304. Marchant also published a letter from Stokes rejecting the "swoon" theory of Christ's resurrection in James Marchant, *Theories of the Resurrection of Christ* (London: Williams and Norgate, 1899), pp. 48-52.

That Man consisted of something besides ponderable matter — something which could therefore be immortal — Stokes thought was shown by ordinary experience. We retain our personal identities, as evidenced by memory, even though the matter of our bodies continually changes.[44] At the end of a fainting spell, even a long one, our thoughts can flow continuously from their state before the spell, even though our always changing material bodies must have altered to some extent during the interval of unconsciousness (Stokes, " 'I,' " pp. 6-7). The corollary of materialism, determinism, is so contrary to our sense of free will that the whole point of view flies "completely in the face of common sense" (p. 8). Materialism was possible, Stokes thought, only for someone who thought the activity of ponderable matter sufficient to explain everything. But such well-established scientific entitites as luminiferous ether, magnetic force, and gravitation demonstrated the insufficiency of ponderable matter and mechanical principles by themselves (pp. 8-10). Such "mysterious" agents seemed to require "something which we must regard as superadded to the mechanical properties of matter."[45] However, though "the materialistic hypothesis" was inadequate, so also was what Stokes called "the psychic theory," according to which Man consisted of body and soul, soul being inherently immortal and hampered in its functions because of its union with body. This view, also, Stokes argued, foundered on ordinary experience. When the body became incapacitated — through, for example, fainting, injury, or near drowning — the soul was not liberated to think more clearly, quite the contrary (Stokes, " 'I,' " pp. 10-12). Moreover, there existed no good, non-Biblical arguments in favor of the psychic theory.[46]

More important for Stokes, neither was there Biblical authority for innate immortality. The message of Biblical passages dealing with eternal life was that it was for the redeemed, the rest meeting extinction (Stokes, *Conditional Immortality*, p. 16). In John 3:16, for example, Jesus stated: "For God so loved the world, that he gave his only begotten Son, that whosoever believeth in him should not perish, but have everlasting life" (pp. 72-73). Stokes cited Paul also: "He says later on, 'If the dead rise not, . . . let us eat and drink, for to-morrow

[44] G. G. Stokes, " 'I': A Lecture on the Immortality of the Soul," *The Family Churchman* (8 April 1890), pp. 3-5.

[45] Stokes, *Natural Theology*, II, 34. I hope to examine Stokes's views of the ether more thoroughly elsewhere. They differed from his earlier views, for which see D. B. Wilson, "George Gabriel Stokes on Stellar Aberration and the Luminiferous Ether," *British Journal for the History of Science*, 6 (1973), 57-72.

[46] G. G. Stokes, "Is the Soul of Man by Its Nature Immortal?," pp. 129-132.

we die.' How completely he ignores the Platonic doctrine of natural immortality of the soul."[47] Indeed, the concept of conditional immortality, the view of "Life in Christ," provided a basic insight into the Bible's true meaning: "It is wonderful what harmony it introduces, both between one part of Scripture and another, and between the teaching of Scripture and what commends itself to our moral sense. As a friend of mine in Cambridge, before whom I brought that view, said to me, 'Reading the Bible with that idea in the head is like turning a key in an oiled lock' " (Stokes, *Conditional Immortality*, p. 19).

The theory of Man's tripartite nature, more ambiguous than the notion of conditional immortality, attempted to explain Man's present makeup and to understand what part survived death. Again, there were two parts to the discussion, Biblical and non-Biblical. The non-Biblical argument focused on the already mentioned insufficiencies of the psychic theory and involved the limitations of soul evidenced by its close association with thought and consciousness which were so frequently absent. In the Gifford Lectures, Stokes, combining parts of the psychic and materialistic theories, postulated a deeper theory incorporating a third component:

> May it not be there is a something constituting the ego which, on the one hand, is not to be identified with thought, and which may exist while thought is in abeyance: while, on the other, it is not to be identified with ponderable matter, but yet exercises over ponderable matter a sort of command? May it not be that thinking is a process which results from the interaction of the ego on the organism with which the ego is associated, over which it is, as it were, placed in command? According to this view, the ego is something lying deeper down in our nature than thought itself — something the destruction of which is not involved in the destruction of the body, inasmuch as it does not consist of ponderable matter — something which might conceivably, without any breach of continuity, preserve the personal identity between the man who died and the same man in some different stage of existence.
>
> (Stokes, *Natural Theology*, I, 95).

Stokes speculated that thought would survive as a function of ego. Ego might be able either to think by itself or through interaction with the "future body" which "is promised according to the Christian religion" (I, 97).

The argument to this point may appear somewhat thin. Has not Stokes needlessly conflated soul and thought, thus artificially creating the requirement for a third entity? Could not soul rather easily be made to serve the functions that Stokes reserves for ego? Regarding soul's connection to body, does not the cessation of thought in an incapacitated body support Plato's view more than Stokes's? Could not a Platonist readily answer Stokes's objections? However such questions might be answered, the historical point to be realized is that any weakness in the above arguments would, for Stokes, simply demonstrate the limitations of natural theology. The real source of knowledge in these matters was not reason, but revelation.

Precluded from discussing Scripture in the Gifford Lectures, Stokes stated merely that, contrary to Plato's theory that Man consists of body and soul, "in Scripture we have a threefold division, into body, soul, and spirit" (Stokes, *Natural Theology*, I, 102). The exegetical problem was to distinguish between spirit and soul. On the back of a letter to him, Stokes listed nearly two dozen verses from the New Testament under the heading "spirit ≠ soul."[48] In print, he cited the creation of Man in Genesis where "we meet with the expression that God breathed into man's nostrils, after he was formed, 'the breath of life, and man became a living soul.' " Though one should not be naively literal about this passage, nevertheless, this "breath" or "spirit" according to Stokes, "is spoken of as a sort of energy, the interaction of which with the material organism produced a living being. It is represented therefore, not so much as a living thing, but rather that which lay at the very basis of life, something deeper down even than very thought itself."[49] Moreover, Stokes pointed out, in Scripture "when that in man which is not put an end to by death is spoken of, it is not, I think, called 'soul,' but 'spirit.' "[50] For example, Luke 23:46: "And when Jesus had cried with a loud voice, he said, Father into thy hands I commend my spirit: and having said thus, he gave up the ghost." (This verse is listed on the back of Routh's letter.)

Hence, Stokes thought that one's personal identity resided in one's spirit, or ego, not one's soul. Spirit produced manifestations of life, like thought, through interaction with the body-soul component of the organism. Spirit survived death, and those spirits meriting eternal life were provided, presumably at the time of the Judgment, with another body. "What the nature of this body may be we do not know, but we are pretty distinctly informed that it will be something very different from that of our present bodies."[51] Though evidence re-

[47] Stokes, *Conditional Immortality*, p. 70, and "Is the Soul of Man by Its Nature Immortal?," p. 136. Paul's statement is in 1st Corinthians, 15:32.

[48] E. J. Routh to Stokes, 2 November 1902, Stokes Collection, R1118. The notes by Stokes are undated but obviously date from the last few months of his life, as he died in February 1903.

[49] Stokes, " 'I,' " p. 14. He also discussed there Romans 8:10, one of the verses listed on the back of Routh's letter.

[50] Stokes, " 'I,' " p. 15. Stokes gave as examples Acts 7:59 and Hebrews 12:23.

[51] Stokes, " 'I,' " p. 17. Stokes quoted from 1st Corinthians 15:35-37.

garding one's state between death and Judgment was "exceedingly meagre," Stokes leaned to the view that during that time, life persisted but thought did not. Stokes was undoubtedly attracted by the fairness of this view, for each person, no matter how long before the Judgment he or she died, would be unaware of the passage of time and thus relieved of a long or short period of anxious waiting. We would perceive ourselves to "be brought immediately face to face with our final account to receive our final destiny." Again, fainting afforded an analogy: "I told you I knew from my own experience how very curiously time appears to be annihilated so long as one is in a faint" (Stokes, " 'I,' " p. 21).

The doctrines of Man's tripartite nature and of his unconscious state between death and Judgment were not nearly so important as the doctrine of conditional immortality. It was this last that dealt with the baneful doctrine of eternal punishment, Stokes's childhood bogeyman, which now was alienating from Christianity members of his own social-intellectual milieu as well as members of the working class. Yet, the doctrine of Man's tripartite nature did more than help clarify questions of immortality, for in doing so it struck another blow at Platonism's pernicious infiltration into Christianity. Indeed, Stokes would not have appreciated being called a "dualistic idealist," for that label smacks far too much of Platonism.

III

Stokes declared his position regarding evolution as early as 1864. In a move that year against the implications of *Essays and Reviews* and the *Origin of Species*, a few scientists promoted a *Declaration* of scientists that there was no real conflict between science and religion.[52] Though Stokes "cordially approved of the *general* spirit of the declaration," he declined to sign, disagreeing with the declaration's statement of the relationship between scientific and religious knowledge. He wrote to C. E. Grove, one of the declaration's sponsors:

> I do not believe that it is the office of the Bible to teach us natural science, and consequently I do not well see how scripture and science properly understood can well come into collision. I don't see then that there is room for the expression "however much they may appear to differ." I see no necessity for supposing that inspired writers were by their inspiration guarded from errors on points of mere natural science. . . .

[52] W. H. Brock and R. M. MacLeod, "The Scientists' Declaration: Reflexions on Science and Belief in the Wake of *Essays and Reviews*, 1864-5," *British Journal for the History of Science*, 9 (1976), 39-66.

> There is one subject, and at present I can think of but one, to which these remarks do not apply: I mean the Mosaic account of the creation. Here the writer professes to describe what could not be cognizable by man; and I see no alternative but either to accuse the writer of wilful falsehood, or accept the account as true in *some sense*. The fact that our definition of day depends upon the sun, while Moses speaks of days prior to the account of the creation of the sun, releases us at once it seems to me from all *necessity* of interpreting the day to mean 24 hours. One grand picture recurs through the Mosaic account — that creation was not a single act, but a succession of acts exerted at successive times. And I know no other way of accounting for the fact, disclosed by geology, of the successive existence of different species and even genera and tribes of plants and animals inhabiting the earth. For no attempt that has been made to refer this succession to second causes leaves on my mind the slightest shadow of satisfaction.[53]

The letter expressed convictions which informed Stokes's writings over the next few decades. Though remaining opposed to evolutionary theory, he eventually found in "Scriptural evolution" a way of protecting his main conclusions from a possible, future verification even of human evolution.

Stokes thought science and religion, ideally, would occupy their separate realms with no conflict, but the actual situation was more ambiguous. It was not that science, even in the ideal case, would be totally separate from religion, for Stokes thought that "man's mental powers, as well as his bodily frame, were designed to be what they are" (*Natural Theology*, I, 231) and that we cannot "imagine that God would deceive His creatures by giving them faculties the right exercise of which would lead to a conclusion at variance with" conclusions from revelation or from exercise of the moral faculties.[54] However, though Stokes thought that science was always progressing, one "must not assume that everything in Nature is capable of explanation by purely scientific methods."[55] Moreover, "it appears to be *God's plan of dealing with man* not to make the evidence for revealed truth of that absolutely overwhelming character which should force assent" (Stokes to C. E. Grove), and one should therefore be wary of confusing interpretation of Scripture with Scripture itself. Hence, in this complicated world, humans had to deal with different, incomplete, but Divinely sanctioned sources of knowledge — moral, Biblical, scientific. Squabbles could obviously arise as things were sorted out. For example, in rejecting Galileo's arguments and the findings of early nineteenth-

[53] Stokes to C. E. Grove, 28 July and 8 September 1864, Cambridge University Library, Add. Mss. 5989, sheets 45, 46, 55, and 56.

[54] G. G. Stokes, "Science and Faith," *Official Report of the Church Congress*, 33 (1893), 341.

[55] G. G. Stokes, "The Luminiferous Ether," *Journal of the Transactions of the Victoria Institute*, 25 (1893), 90.

century geology, churchmen had claimed too much for Scripture.[56]

Stokes's view of the evolution of the solar system displayed the resultant interplay between sources of knowledge. In the letter from 1864 quoted above, for example, Stokes did not abandon literal twenty-four-hour days because Genesis was unscientific, but instead because Genesis told of "days" before the sun existed. Genesis was "true in some sense." Stokes later noted that recent spectroscopical evidence supported Laplace's nebular hypothesis, according to which a nebula of non-luminous matter slowly condensed, first becoming luminous matter and eventually contracting sufficiently to form the sun. The earth and the other planets formed from bits of the hot, luminous matter left behind in the process of condensation. Thus, while the large, luminous nebula slowly shrank into a sun, the small, molten earth was more quickly cooling towards its present condition. "It seems probable that the earth would have made considerable progress in its cooling, and what depends upon it, before the luminous matter inside its orbit would have collected into a definite sun."[57] A few years later he suggested another possibility: that the sun formed from a nebula on the first "day" but was not itself clearly visible from the earth until the fourth, when the earth's initial steamy atmosphere had cleared.[58] Either way, the scientific account agreed well enough with the Biblical narrative. Light appeared on the first "day" well before the sun on the fourth, and that light nourished vegetation appearing on the third. That other details might not fit the scheme so well bothered Stokes little: "But if we suppose that the record in Genesis was meant for the people of the time, . . . then it would be preposterous to demand scientific accuracy of detail. A general rough accordance is all that we ought to expect; and that I think we have" ("Genesis and Science," p. 51). The sense in which Scripture was true thus lay somewhere between "slavish literalism" and scientific accuracy.

The history of the earth and its life raised similar conceptual problems. Science both explained and indicated where explanation was impossible. Laplace's nebular theory, for example, indicated a long history for the earth from molten mass to life-filled globe. Geology

[56] Stokes, "Science and Faith," p. 341; G. G. Stokes, "On the Absence of Real Opposition between Science and Revelation," *Journal of the Transactions of the Victoria Institute*, 17 (1883), 196; and G. G. Stokes [Address at Annual Meeting], *Journal of the Transactions of the Victoria Institute*, 22 (1887), 17.

[57] G. G. Stokes, "Genesis and Science," *Expositor*, 4th series, 3 (1891), 46.

[58] Stokes to A. H. Tabrum, 17 August 1900, in Larmor, ed., *Memoir and Scientific Correspondence*, I, 86-87.

demonstrated how dramatically the earth's surface and its life had changed. At the same time, "the progress of science . . . leaves barriers which it gives no indication that science will ever be able to get over; nay, sometimes it makes the existence of such barriers more apparent."[59] Such barriers were the origin of life on the cooling earth and the gaps between widely different forms of animals whose fossils were preserved in geological strata. Stokes saw "no prospect" of explaining these by the operation of natural causes.[60] Indeed, respecting the origin of life, "several persons who, in other respects, go in completely for evolution, allow that, in this case, something more is required."[61] Here, science provided evidence for God's intervention in nature, an intervention occurring "not merely at some indefinitely remote time which we please to contemplate as that of the origin of things," but at a time recent enough to be accessible to our understanding.[62] And if in this instance "we must have recourse to some ultra-scientific cause, there is nothing unphilosophical in the supposition that this ultra-scientific cause may have acted subsequently also" (*Burnett Lectures*, p. 335). Subsequent acts included the origin of new sorts of animals, for detectable evolutionary processes were quite limited. Darwin's pigeons were still pigeons, his finches still finches. Such restricted transmutations as these were clearly inadequate to "bridge over the enormous interval which separates an oyster from a man," and claims to the contrary were merely "utterly rampant" speculation.[63] Once again, there was "general rough accordance" between science and Scripture, because, as Stokes stated in 1864, Genesis' "grand picture" portrayed God's creation as a succession of creative acts.

The most important of these acts, of course, was the creation of Man. Stokes, though still avoiding a *slavish* literalism, insisted on a Genesis interpreted more literally than in other cases: "In the account of the creation it is distinctly stated that man was separately created, 'in the image of God,' whatever that may imply. Nor is this a point in which by a wide licence of interpretation we might say the language

[59] Stokes, "On the Bearings of the Study of Natural Science," p. 232. See G. G. Stokes, "Literature of the Day, and Its Attitude towards Christianity," *Official Report of the Church Congress*, 29 (1889), 212.

[60] Stokes, "On the Bearings of the Study of Natural Science," pp. 235-236.

[61] Stokes, *Natural Theology*, II, 181. Relevant to this point was nineteenth-century research, some of it done by Tyndall, which opposed the possibility of the spontaneous generation of life. See Stokes, *Natural Theology*, I, 171, and G. G. Stokes, "Religious Benefits from Recent Science and Research," *Official Report of the Church Congress*, 19 (1879), 424.

[62] G. G. Stokes, *Burnett Lectures. On Light*, 2d ed. (London: Macmillan, 1892), p. 331.

[63] Stokes, "Religious Benefits from Recent Science and Research," pp. 424-425.

was merely figurative; that we can afford to understand it so, for that Scripture was not given to teach us Science" ("On the Absence," p. 200). In addition, Biblical discussion of the origin and initial condition of human beings was not confined to Genesis. "They are dwelt on at length, in connexion with the scheme of redemption, by St. Paul, and are more briefly referred to by our Lord himself, in connexion with the institution of marriage" ("On the Absence," p. 201). Consideration of the moral faculties of humans reinforced the Biblical narrative. Both internal inspection of one's own moral convictions plus examination of moral convictions in other cultures demonstrated the persistence of an innate sense of right and wrong even though people often behaved immorally.[64] Man had been created innocent, but had fallen. Against such impressive Biblical and moral evidence, evolution could offer "nothing more than a hypothesis of continuous transmutation, incapable of experimental investigation, and making such demands on our imagination as to stagger at least the uninitiated" ("On the Absence," p. 201). In fact, "some even strongly pronounced evolutionists would seek something beyond evolution for the origin of man upon earth" (*Natural Theology*, II, 166). If humans were formed from animals by natural evolutionary processes, then it would be the Author of those processes, not humans, who was responsible for their sinful state.[65] For such reasons, even stronger evidence should be required for a theory of human evolution than for other scientific theories: "If some conclusion to which science seems to point throws a serious difficulty in the way of what we have been in the habit of considering was revealed to us, specially if it be a difficulty of a moral nature, we have a perfect right to demand severer evidence before we can accept it than what might have sufficed to lead us to regard it as in all probability true had there been no such appearance of opposition" ("On the Absence," p. 204).

Unsurprisingly enough, it was Scripture, not science, which gave Stokes a way to allow for the possible verification of human evolution. In 1889, by which time evolution was becoming widely accepted, Reverend J. H. Lamb sent Stokes a copy of his paper illustrating "evolution with Divine intervention by the Scriptural account of the Incarnation," which "struck me very much, and is I think calculated to do much good to some whose faith may be tottering in consequence of the supposed demands which science makes for the

[64] Stokes, "On the Absence," p. 201, and Stokes, *Natural Theology*, I, 224-233, II, 181-182, 197-198.
[65] *Natural Theology*, II, 177, and "On the Absence," p. 201.

acceptance of evolution." In the Incarnation, "the first inception of the human life of the Incarnate Word was by a supernatural act of Divine power," but thereafter that life developed in an ordinary human way in the womb through childhood into adulthood. "Here then is an instance of Divine Interposition, gigantic in its result, and yet of such a nature as not to offer any visible exception to the doctrine of evolution: of something superadded to, rather than running counter to, evolution."[66] Citing Lamb's argument in an 1892 letter to Marchant, Stokes declared that the assumption "that man took his origin by a supernatural modification of some previously-existing animal organism" was "a position which no study of evolution can overturn, or could overturn, unless we were prepared to account for the whole of the cosmos by mere natural causes, without the intervention of a Supreme Being."[67] This supposition as much required "a creative power as if man had been formed directly from materials not endowed with life."[68]

Scripture, science, and morality combined, therefore, to disclose a God who intervened in the course of nature in various ways. He could act by fiat, leaving empirically detectable traces in the form of discontinuities in the universe's otherwise continuous development. The origin of life was the most obvious such discontinuity, but the origin of species and the origin of Man were others. God could also act by fiat, leaving no empirically detectable traces. The Incarnation was the most important example, but if biologists could establish a convincing theory of human evolution, then the origin of Man would become another. Third, God could act through established laws. He could, for example, prevent the heat death of the universe suggested by the second law of thermodynamics, merely by utilizing natural laws to effect the statistically improbable, but possible, reversal of the dissipation of energy.[69]

[66] Stokes's copy of his letter to Rev. J. S. Exell, editor of the *Homiletic Magazine*, 17 April 1889, Stokes Collection, E241.
[67] Stokes, *Conditional Immortality*, pp. 43-44. See Moore's discussion of traducianism for a theological theory of human reproduction that helped some nineteenth-century Christians accept evolution. James R. Moore, *The Post-Darwinian Controversies: A Study of the Protestant Struggle to Come to Terms with Darwin in Great Britain and America, 1870-1900* (Cambridge: Cambridge University Press, 1979), pp. 336-337.
[68] Stokes, *Natural Theology*, II, 167. See Stokes to A. H. Tabrum, 7 August 1900, in Larmor, ed., *Memoir and Scientific Correspondence*, I, 85.
[69] Stokes, "On the Bearings of the Study of Natural Science," pp. 236-238. Stokes also thought the law of the dissipation of energy implied a Divine creation of the universe: "we are obliged to refer to a First Cause." Stokes's remarks seconding acceptance of a report in *Journal of the Transactions of the Victoria Institute*, 20 (1886), 13.

Opposed to Stokes's position was not the idea of accepting evolution as a working hypothesis to see where it would lead, but the militant contention that evolution was firmly established and, more important, that it had already led to materialism. "Of course," Stokes explained, "we may assume evolution *for trial*, . . . but to adhere to it when there appears not the slightest prospect of its competence to account for the phenomenon presented does, I confess, seem to me to indicate an *animus* in the direction of endeavouring to dispense with a Creator" (*Natural Theology*, I, 170-171). It was one thing to trace evolutionary processes as far as possible, quite another to assume that they "must" suffice to account totally for the development of the earth and its life ("On the Absence," p. 198). Such a continuous connection between matter, animals, and Man would render Man not just another animal, which was bad enough, but a machine, thus doing away with morality and immortality (*Natural Theology*, II, 55-58). How can one hold a machine accountable for its actions? What part of our material bodies could be conceived to survive death?

IV

Tyndall provided the greatest animus in his "bold" and "unflinching" Belfast address, which Stokes thought, might turn out actually to aid the cause of religion:

> In the attempt to deduce ourselves and our surroundings from that primeval condition of matter by mere evolution, by which I mean the blind operation of natural laws, he is obliged to endow with emotion the ultimate molecules of matter in a fiery nebula, and to adopt a series of conjectures against which common sense rebels. The glove is boldly taken up, and the result is a *reductio ad absurdum*.[70]

Tyndall's materialism may have led to a *reductio ad absurdum*, but it still warranted a specific alternative. Stokes provided one with "directionism." It was an alternative Stokes outlined as early as 1879 and finally labeled in 1893. "To save circumlocution, I will coin a word, and call the view which I have been endeavouring to put before you *directionism*. The alternative views would then be named materialism and directionism."[71]

[70] Stokes, "Religious Benefits from Recent Science and Research," p. 424. He felt the same two decades later: "Tyndall . . . was led to attribute emotion to the ultimate molecules of matter in a fiery mass of gas!" (Stokes to A. H. Tabrum, 3 August 1900, in Larmor, ed., *Memoir and Scientific Correspondence*, I, 83).

[71] Stokes, *Natural Theology*, II, 47. The 1879 reference is Stokes, "Religious Benefits from Recent Science and Research," pp. 421-422. He repeated the idea in 1880 in "On the Bearings of the Study of Natural Science," p. 230.

Directionism responded to Tyndall's use of the doctrine of the conservation of energy to help eradicate the distinction between life and non-life. "Of still wider grasp and more radical significance" even than Darwin's theory, the conservation of energy, according to Tyndall in his Belfast address, " 'binds nature fast in fate' " to an extent not hitherto recognized, exacting from every antecedent its equivalent consequent, from every consequent its equivalent antecedent, and bringing vital as well as physical phenomena under the dominion of that law of causal connexion which, so far as the human understanding has yet pierced, asserts itself everywhere in nature."[72]

Disagreeing, Stokes explained that religious men should not worry that the law of the conservation of energy appeared to hold for living things as well as non-living. The essence of directionism lay in that non-material aspect of a person which directed physical activity in the body without opposing it or holding it in check. In contrast to that earlier kind of vitalism, Stokes envisioned "a directing power, not counteracting the action of the physical forces, but guiding them into a determined channel" (*Natural Theology*, II, 46). He used the analogy of a moving train, declaring that the human will was like "the intelligence of the engine-driver" not "the coals under the boiler."[73] Indeed, the fact that will appeared to lie outside the arena of energy conversions and transfers caused Stokes also to reject the conservation of energy as providing a relevant argument for immortality.[74]

Directionism obviously dovetailed with Stokes's Biblically derived theories of conditional immortality and the tripartite nature of Man, though the latter's notion of potentially immortal ego-spirit was more refined and definite than directionism's notion of guiding will. Moreover, by bringing before us the concept of one entity acting on another *entirely different*, directionism "led on to the contemplation of that mystery of mysteries, Will, . . . to the contemplation of Will, and of the effects of its exercise" (*Natural Theology*, II, 47, 54). Just as will influenced body, so also God did nature, both by independent fiat and through established law. Furthermore, directionism resembled Stokes's scientific view of how non-mechanical gravity and ether operated on ponderable matter. In fact, Stokes preferred directionism to other forms of non-materialism because "that form of the alternative to materialism strikes me as being more nearly analogous to what we

[72] Tyndall, *Report of the British Association* (note 1) (1874), p. lxxviii.

[73] Stokes, "On the Bearings of the Study of Natural Science," p. 230.

[74] Stokes, *Conditional Immortality*, pp. 32-34. See Rowell, *Hell and the Victorians*, p. 205.

know in science than are certain other forms" (*Natural Theology*, II, 55). Stokes did not think that natural science could demonstrate the reality of human immortality, but "I do think that natural science can, by pointing out the insufficiency of the materialistic hypothesis, remove the apparent incredibility of any such revival [*sic*, should be survival], so as to leave the mind open to weigh any evidence in favour of survival that may come from a totally different quarter" (II, 57). Consequently, directionism, with its analogical alliance with natural science, was strategically placed to counter materialism and its attendants, extreme evolution and scientific naturalism.

Stokes was not only disputing Tyndall's application of the doctrine of the conservation of energy, in doing so he was also, in effect, using physics to adjudicate a dispute between biology and the Bible. Contrasting current knowledge of biological and physical laws, for example, Stokes supposed "that biologists, as well as physicists, would allow that we know more about physics than we do about biology" (II, 236-237). Not only was physics more advanced than biology, but it had higher standards governing inferences made from available evidence: "[Darwin's] theory has been accepted by many eminent biologists with a readiness that is puzzling to an outsider, especially one accustomed to the severe demands for evidence that are required in the physical sciences."[75] When scrutinized by the standards of advanced modern physics, biological evidence was revealed as only adequate to support limited evolution, far short of the extreme, materialistic version being claimed. Such an extreme view could be accepted, Stokes thought, only in spite of, not because of, biological considerations and only in the absence of legitimate religious considerations. In addition, advanced modern physics disclosed to Stokes a world in harmony with the nonmaterialism of the Bible. Accepting geology's claims against the Bible and rejecting slavish literalism, Stokes fixed his moral and intellectual faculties upon the honest narrative of Jesus's character and teaching. Thus approached, Scripture joined with the methods and content of physics to define biology's present, and future, limitations.

Stokes evidently thought his idea of directionism was original, but, if so, he was wrong. P. G. Tait, a member of Stokes's audience in Edinburgh in 1893, referred Stokes to an article in the 1874 edition of Robert Chambers's *Encyclopaedia* in which he had written of the possible existence of a "vital force" which "is not a force which does

[75] Stokes, "On the Absence," p. 200. He made the same point in "On the Bearings of the Study of Natural Science," p. 235.

work, in the mechanical sense of the term, but merely *directs*, as it were, the other natural forces *how to apply* their energies."[76] In fact, Tait's article appeared first in the 1862 edition of Chambers's *Encyclopaedia*. This was the same year he and William Thomson (later Lord Kelvin) published a popular article in *Good Words* on "Energy" in which they stated, "It seems even probable that it is actually through electric force that the energy of the food is placed at the disposal of that most inscrutable of finite, created, and subject agencies, a free will directing the motions of matter in a living animal."[77] Later, Kelvin, though without referring to energy considerations, drew the contrast between materialism and a religious notion of free will: "The perception of every one of the human race of his own individuality and free will seems to me to absolutely disprove all materialistic doctrines and to give us scientific ground for believing in the Creator of the Univ[erse] in whom we live and move and have our being."[78] In addition, Balfour Stewart, Tait's collaborator on *Unseen Universe*, thought that life, like a military commander, is "a consummate strategist, who, sitting in his secret chamber, before his wires, directs the movements of a great army."[79] In turn, Stewart attributed to the physicist James P. Joule, the physiologist William B. Carpenter, and the German physicist-physiologist J. R. Mayer the view that life "as far as energy is concerned, is not creative, but only directive."[80] The physicist Oliver Lodge carried the idea well into the twentieth century:

[76] P. G. Tait, "Force; Energy," *Chambers's Encyclopaedia*, rev. ed., 10 vols. (London: W. & R. Chambers, 1874), IV, 421. Stokes reported Tait's communication to him in *Natural Theology*, II, 47n.

[77] William Thomson and P. G. Tait, "Energy," *Good Words* (1862), 605. Thomson and Tait's view on this question was one of the subjects discussed by Crosbie Smith in "The Irreversible Cosmos: William Thomson and the Universal Dissipation of Energy," read to the British Society for the History of Science, 6 July 1983.

[78] Kelvin to Professor J. Helder, 12 May [1906], printed in Wilson, "Kelvin's Scientific Realism," (note 9), p. 60. There are many statements in this vein in Kelvin's writings, beginning as early as 1852: "On the Mechanical Action of Radiant Heat or Light: On the Power of Animated Creatures over Matter: On the Sources Available to Man for the Production of Mechanical Effect," *Mathematical and Physical Papers* (note 7), I, 509.

[79] Balfour Stewart, "The Conservation of Energy," in *Humboldt Library of Popular Science Literature*, no. 7 (15 January 1881), 412. B. Stewart and P. G. Tait, *The Unseen Universe, or Physical Speculations on a Future State*, new ed. (London: Macmillan, 1889).

[80] Stewart, "The Conservation of Energy," p. 413. Carpenter, for example, affirmed the compatibility of two doctrines: "that of the dependence of the Automatic activity of the Mind upon conditions which bring it within the nexus of Physical Causation; and that of the existence of an independent Power, controlling and directing that activity, which we call Will" (W. B. Carpenter, *Principles of Mental Physiology* [New York: D. Appleton and Co., 1874], pp. lvi). Carpenter, however, placed his concept of a directing power in the context of the notion of the "correlation of forces," probably making it not so separate from other powers or energies as did directionism, which was conceived in the context of the more quantitative doctrine of the conservation of energy. (On Carpenter, see Roger Smith, "The Human Significance of Biology: Carpenter, Darwin, and the *vera causa*," in U. C. Knoepflmacher and G. B. Tennyson, eds., *Nature and the Victorian Imagination* [Berkeley: University of California Press, 1977], pp. 216-230.)

"Life is not energy, it merely directs the energy which it finds available."[81] Whether Stokes was fully aware of it or not, he clearly was not alone in his concept of directionism.

We should see the context of Stokes's directionism, therefore, not only in terms of his specific scientific concepts and of his personal religious development. That religious part of the context did provide sufficient motive for him to use as he did his position of eminence in an increasingly eminent profession. Within that profession of science, however, there were divisions of discipline and viewpoint. Not long after Kelvin had wielded thermodynamics against the geological uniformitarianism which undergirded the naturalism of Darwinian natural selection,[82] Stokes was pitting physics against biology and, thus, science against materialism. Of similar view to Stokes's were the religious physicists Joule, Kelvin, Tait, Stewart, and Lodge. Broadly speaking, Stokes's physicist's alternative to materialism represented an older, clergy-gentry, Newtonian tradition in counterpoint to the newer (and growing), middle-class, professional, scientific naturalism epitomized by the biologist-philosopher T. H. Huxley.[83] Without claiming that the context determined Stokes's idea of directionism, we can certainly see that the concept stood for more than itself.

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[81] Oliver Lodge, *My Philosophy: Representing My Views on the Many Functions of the Ether of Space* (London: Ernest Benn, 1933), p. 74. See also, Lodge, *Man and the Universe: A Study of the Influence of the Advance in Scientific Knowledge upon Our Understanding of Christianity*, 5th ed. (London: Methuen, 1908), p. 62. For studies of Lodge, see John D. Root, "Science, Religion, and Psychical Research: The Monistic Thought of Sir Oliver Lodge," *The Harvard Theological Review*, 71 (1978), 245-263, and D. B. Wilson, "The Thought of Late Victorian Physicists: Oliver Lodge's Ethereal Body," *Victorian Studies*, 15 (1971), 29-48.

[82] Using the physics of the day, Kelvin calculated that the cooling earth could only have been habitable for several million years, not for the virtually unlimited period of time envisioned by uniformitarian geologists. He further argued that though evolution may have occurred, the earth had not been habitable long enough for evolution to have been caused by the slow process of natural selection, a process which he opposed also because it greatly decreased the amount of God's design in the world. Kelvin's figures influenced late Victorian biological and geological thought, but the discovery of radioactivity in 1896 eventually led to the rejection of his value for the age of the earth. (See Burchfield, *Kelvin and the Age of the Earth* [note 9], and D. B. Wilson, "Shaping Modern Perspectives: Science and Religion in the Age of Darwin," in D. B. Wilson and W. D. Dolphin, eds., *Did the Devil Make Darwin Do It? Modern Perspectives on the Creation-Evolution Controversy* [Ames, Iowa: Iowa State University Press, 1983], pp. 3-19.) Regarding the perceived differences between biologists and physicists, Kelvin thought in 1903 that biologists were *returning* to his point of view: "Modern biologists are coming, I believe, once more to a firm acceptance of something beyond mere gravitational, chemical, and physical forces; and that unknown thing is a vital principle" ("Lord Kelvin on Science and Theism," *Nineteenth Century*, 53 [1903], 1060).

[83] Though Huxley, like Stokes, grew up with Evangelical Christianity, quite unlike Stokes he went on, of course, to champion evolutionary theory, write with facility on Hume and Kant, and harshly

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WHETHER OR NOT PRESENT-DAY HISTORIANS ACCEPT A CLASS
English society, nineteenth-century English pedagogues
ceived a three-tiered division of upper (landed) class, m
working class, and the need for a three-track educati
match. Although radicals attacked the public schools a
Cambridge Universities for failing to meet the needs
classes, the schools and Oxbridge steadfastly refused to
was a "liberal education" concerned not with mod
business procedures, and similar middle-class needs, b
training, character building, and religious indoctrinat

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[1] See R. L. Archer, *Secondary Education in the Nineteenth Century* (1921; rpt
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(Cambridge: Cambridge University Press, 1950). That the English pedag
consciousness of their time does not substantiate the class conflict expla
education developed. See Sheldon Rothblatt, *The Revolution of the Dons* (
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Educational Change in England and France (Cambridge: Cambridge Uni
10-15.