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Eighteenth Century Evangelical Responses to Science: John Wesley's Enduring Legacy

John Wesley (1703–1791) maintained a lifelong interest in the natural sciences. This was reflected in his reading, interaction with scientists and incorporation of scientific material in his sermons and other writings. He particularly valued the use of science in medicine and in the education of his lay preachers. Wesley's emphasis on the themes of mankind's probation and redemption was accompanied by an attempt to describe the physical and biological state of the world as salvation history was being played out. Although criticized for his suspicion of theoretical systems and emphasis on the limits of natural knowledge, he was willing to accept new scientific ideas except where they threatened Christian faith. Succeeding generations would apply his scientific interests to serve diverse agendas.

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Introduction

John Wesley (1703–1791) cast a long shadow over the English-speaking 18th century world. Founder and long-term leader of Methodism, he played a major role in the emerging evangelical movement.¹ While Wesley is known primarily for his role in preaching the gospel and his system for building up those attracted to his movement, he had diverse intellectual interests and engaged many of the issues stemming from the Enlightenment.²

One generally overlooked Wesleyan concern was his life-long interest in the progress of science³ and the ways in which it could serve the Christian cause. Four decades ago, Robert Schofield sought to fill this vacuum with an analysis of Wesley's scientific views and their influence on his constituency.⁴ Schofield ably illustrated the breadth of Wesley's

1 Bebbington, D., *Evangelicalism in Modern Britain: A History from the 1730's to the 1980's*, London: Unwin Hyman (1989), ch. 2 offers an analysis of Wesley's role in the Evangelical movement.

2 Rack, H. D. *Reasonable Enthusiast, John Wesley and the Rise of Methodism*, Philadelphia: Trinity Press (1989) and Brantley, R. E. *Locke, Wesley and the Method of English Romanticism*, Gainesville: University of Florida Press (1983) provide recent assessments of Wesley.

3 I have used the word science to describe activities which fell within the eighteenth century category of natural philosophy.

4 Schofield, R. E. 'John Wesley and Science in 18th Century England', *Isis* (1953) 44, 331–340.

interests and dispelled some of the long-standing myths of his alleged anti-science mentality perpetuated in such works as Andrew Dixon White's *A History of the Warfare of Science with Theology in Christendom* (1865)⁵ and recently echoed in the Bicentennial Edition of *Wesley's Works*.⁶ However, Schofield's analysis was limited by his unwillingness to evaluate Wesley's views in the context of the issues which faced 18th century evangelicals. Wesley's convictions need to be examined in the light of recent 18th and 19th century scholarship if we are to gain a fuller picture of his contribution to the evangelical engagement with science and the evidence for a 'Wesleyan scientific heritage'.

In this paper I will first outline Wesley's mature views on science and the ways that his scientific interests were incorporated into his writings, teaching and medical work. Then I will focus on some ways that Wesley's scientific interests become part of Methodist lore or emerged in new or altered form in later generations.

Wesley was unique among 18th century evangelical clerics in his fascination with the natural sciences. This can be seen in his choice of reading, interest in natural history, interaction with scientists, medical interests and in the various ways that he drew on the natural sciences in his sermons and other writings. Wesley was well acquainted with the place of science in the theological issues of his day and was especially committed to a scientific medicine which was to be practiced in harmony with the new knowledge of the natural world. While he valued the search for understanding nature, his immediate concerns were for practical application to improve the lot of humanity and to buttress the cause of Christ. In an earlier paper I have considered the long-held charge that Wesley was antiscience, concluding that particular 'offensive' remarks could be better understood by considering the scientific and religious context from which they emerged.⁷

God and Nature in Wesley's Theology

The task of identifying the role of science in Wesley's theological vision is complicated by his unwillingness to commit to a single binding theology and the difficulty in discovering what he believed. The terse comments in his *Journal* seldom offered context and the works that he produced as abstracts of the publications of others did not indicate that he agreed with all of the content.⁸ The *Sermons* of the last decade of his life and the prefaces to his scientific works are considered to clearly represent his own views.

5 White, A. D. *History of the Warfare of Science With Theology in Christendom*, New York: Appleton (1895), vol. 1, 128, 148, 220-21, 340, 361, 363.

6 Ward, W. R. and Heitzenrater, R. P. (eds.) *The Works of John Wesley, Journals and Diaries I*, Nashville: Abindgon Press (1988), vol. 18, 31.

7 Haas, J. W. Jr. 'John Wesley's Eighteenth Century Views on Science and Christianity: An Examination of the Charge of Antiscience', *Church History* (forthcoming).

8 Critics of Wesley have often picked on isolated passages for their most vehement comments.

Recent students of Wesley are agreed that his epistemology was influenced by (or paralleled) the Oxford Aristotelian logical tradition, the empiricism of John Locke, the Cambridge Platonists, John Norris, Peter Browne and an eclectic range of other writers including Francis Bacon and Robert Boyle.⁹ Wesley's religious and scientific epistemologies emphasized the role of the natural senses in understanding God and nature. In spiritual matters the spiritual senses of faith are made available by the Holy Spirit to counter the distortions due to defects in the natural senses. His 'system' rejected the notion of innate ideas and emphasized sensory experience as the only source of ideas. Knowledge results from the functioning of human reason in comparing the plethora of sensations and is framed by his conviction that human knowledge of God and the natural world is imperfect.¹⁰ His insistence on how little we really know of the 'works of creation and of providence' explains Wesley's qualified endorsement of an empirically-based natural theology.¹¹

Wesley's life-long opposition to 'systems' led to criticism of him during his life and in later generations. I feel that the core of his hostility to systems lay in the difficulty of relating his providentialist theology to the mechanistic systems then in favor with the Deists. He sought to counter a materialism which saw nature operating without the hand of God. His ambivalent attachment to the biblically based astronomy of John Hutchinson (which he admitted was biblically and scientifically insupportable) was an attempt to counter the deists by bringing God into the picture.¹² It is ironic that Wesley was interested in a system which offered a self-contained world which had no need for God once given initial motion while at the same time rejecting Newton's system which needed occasional correction and emphasized an imminent God which Wesley with his concern for providences would be expected to prefer.¹³ Wesley's own High Church predilections may have led him to prefer Hutchinson's response to Low Church latitudinarian theology which found support in the Newtonianism of the Boyle lectures.¹⁴ He made his peace with Newton late in life.

The immortal man to whose genius and indefatigable industry philosophy owed its greatest improvements, and who carried the lamp of knowledge into paths of knowledge that had been unexplored before, was Sir Isaac Newton, whose name was revered, and his genius admired, even by his warmest adversaries. This great man, spent with uninterrupted assiduity,

9 The Ph.D. dissertation, Matthews, R. *Religion and Reason Joined: A Study in the Theology of John Wesley*, Ann Arbor, MI, University Microfilms International (1986) and Brantley, *op. cit.* (2) offer helpful discussions of the complex roots of Wesley's theology.

10 Matthews, *op. cit.* (9), 256-257.

11 See Outler, A. C. (ed.) *The Works of John Wesley*, Nashville: Abingdon (1985) 'The Imperfection of Human Knowledge', vol. 2, 568-586 and 'Walking by Sight', vol. 4, 49-59.

12 See Wilde, C. B., 'Hutchinsonism, Natural Philosophy and Religious Controversy in Eighteenth Century Britain,' *History of Science* (1980), XVIII, 3.

13 *Ibid.*, 6.

14 *Ibid.* Wilde makes this point in arguing that 'Hutchinsonianism was a High Church response to [the] association between Low Church principles and Newtonian science.'

a long life in correcting, digesting, and enlarging the new philosophy, and in throwing upon it the light of demonstration, both by observing the laws of nature, and by subjecting them to the rules of calculation; and thus he introduced a great change into natural science, and brought it to a high degree of perfection.¹⁵

Another system which drew his ire emerged in his *Remarks on the Count De Buffon's 'Natural History' (1782)*.¹⁶ Buffon held the notion that 'every part of every animal or vegetable contains a germ or embryo of the same species which may be expanded to a whole of the same kind'—a view that Wesley denounced as 'utterly inconsistent with reason and Scripture'. Wesley advocated a preformation (or germ) view championed by Charles Bonnet which held that the embryo of every species was preformed in the mother as a tiny seed waiting to grow when given the appropriate stimulus. The first example of the plant and animals of the original Creation contained all the germs which are passed on from age to age to produce subsequent plants and animals. Bonnet's (and Wesley's) thoroughly creationist view also conflicted with Buffon's advocacy of spontaneous generation (the operation of active or self-creative matter). Buffon's notion that most beings contain 'fewer useful or necessary parts than those which are useless or redundant' and denial of final causes led Wesley to dismiss his system as 'Atheism barefaced'.¹⁷ Here Wesley's religious presuppositions influenced his choice of scientific theory.

The doctrine of Providence played a central role in Wesley's view of social and natural history. Gascoigne has argued that the balance maintained at the time of Newton's death between a general providence which created the world *ex nihilo* and established and maintained the laws by which it operated and a special providence which produced miracles and intervened to fine-tune the workings of nature, would swing away from an interventionist deity as the century wore on.¹⁸ High Church orthodoxy and a growing evangelical presence resolved to counter this mood with an apologetic which gave greater emphasis to an *immediate* and *observable* providence. A more accessible natural theology emerged which looked back to Ray and Derham in emphasizing natural history and biological themes over astronomy and mathematics. Wesley agreed. After reading Andrew Ramsay's *Philosophical Principles of Natural Religion Unfolded in a Geometrical Order (1748–9)* he commented 'the treatise gave me a stronger conviction than ever I had before of the fallaciousness and unsatisfactoriness of the mathematical method of reasoning on religious subjects'.¹⁹ Again: 'we can

15 Wesley, J. *A Concise Ecclesiastical History, From the Birth of Christ to the Beginning of the Present Century*, London: Paramore (1781), vol. 3, 332.

16 Wesley, J. 'Remarks on Buffon's Natural History', in *The Works of John Wesley*, XIV vols., Grand Rapids: Zondervan (1958), vol. XIII, 452.

17 *Ibid.*, 452–53, 454–55.

18 Gascoigne, J. 'From Bentley to the Victorians: The Rise and Fall of British Newtonian Natural Theology', *Science in Context* (1988), 2, 230.

19 Wesley, *Works*, *op. cit.* (16), Letter: John Wesley to Dr. John Robertson, September 24, 1753, 216.

have no idea of God, nor any sufficient proof of his being, but from the creatures; and the meanest plant is a far stronger proof than all Dr. Clarke's or Chevalier's [astronomical] demonstrations'.²⁰

Advocates of a voluntarist theology faced the challenge of determining what type of events would demonstrate divine action. Extraordinary events such as volcanoes, earthquakes and comets seemed to fill the bill.

Wesley always had his head cocked for the unusual in nature. The preface to his *Survey of the Wisdom of God* (1763) records his desire to 'recite both uncommon appearances of nature and uncommon instances of art . . . for surely in these appearances, the wisdom of God is displayed'.²¹ His pamphlet *Serious Thoughts on the Earthquake at Lisbon* (1755) forcefully argued that 'nature is the Art of God, or God's method of acting in the material world' and harbored no doubt that the event came from the 'Hand of the Almighty, arising to such an effect'.²²

All his providences, be they mild or severe . . . are all designed either to wean us from what is not, or to unite us to what is worthy of our affection. Every pain crys aloud, 'Love not the world, neither the things of the world'. And every pleasure says, with a still small voice, 'Thou shalt love the Lord thy God with all thy heart'.²³

In the summer of 1755 his *Journal* devoted several pages to speculation on an unusual fall of rocks. After considering various natural causes, Wesley concluded '[God] arose to shake terribly the earth; who purposely chose such a place, where there is so great a concourse of nobility every year; and wrought in such a manner that they might see it and fear'.²⁴

Wesley refused to distinguish between special and general providence calling '[general providence] such stark, staring nonsense as any man of sense ought to be utterly ashamed of'. Wesley saw God as acting equally in 'usual' an 'unusual' events and thus had no need to invoke a 'God of the gaps'.

The interplay of theology and natural philosophy is evident in Arminian Wesley's overriding concern with the freedom of the will. His short papers *Thoughts on Necessity* (1774) and *A Thought on Necessity* (1780) link a mechanical philosophy of the world, a necessitarian psychology and Calvinism. Associationist psychologist David Hartley had built on John Locke's sensationalism to develop a well regarded physiological system which resolved all thought into vibrations of the brain.

This scheme appeared reasonable to Wesley. 'Who can deny', he asked, 'that not only the memory, but all the operations of the soul, are not dependent on the bodily organs, the brain in particular, insomuch that a

20 *Ibid.*, 211.

21 *Op. cit.* (16), vol. XIV, 301.

22 *Ibid.*, vol. XI, 1.

23 Outler, *op. cit.* (11), 'The One Thing Needful' (1734), vol. 4, 256-57.

24 Wesley, *Works, op. cit.*, (16), vol. II, 331-333.

blow on the back part of the head may take away the understanding, and destroy at once both sensation and reflection; and an irregular flow of spirits may quickly turn the deepest philosopher into a madman?'²⁵ However, Wesley drew the line at Hartley's conclusion that this psychology implies determinism—'man has no more liberty in thinking, speaking, or acting, than the stone has in falling'.²⁶ Wesley had no satisfactory scientific answers to counter the determinist conclusions and chose to affirm his Arminian credo that 'however my spirits may flow, or my nerves and fibers vibrate, the Almighty God of love can control them all, and will (unless I obstinately choose vice and misery) afford me such help, as in spite of all these, will put it into my power to be virtuous and happy for ever'.²⁷ The implications of science must bow to those of theology.

The Wesleyan Heritage in Natural Philosophy

Wesley scholars from Whitehead to Halevy have sought to capture the Wesleyan heritage. A decade ago David Hempton's analysis of these studies led him to conclude that 'though the importance of Methodism has been established, its role is still the subject of much debate.'²⁸ For Hempton any definition 'must first grapple with the influence of Wesley himself'.²⁹ Following this line, E. Brook Holifield's *Health and Medicine in the Methodist Tradition* (1986) suggested that Wesleyan attitudes towards illness and healing stem at one level from Wesley's doctrines of creation and providence³⁰ and at a deeper level in 'the duties implicit in love'.³¹

Rack's (1989) study of Wesley's legacy speaks of a worldwide church and participation in the Evangelical Nonconformity of the nineteenth century and of elusive effects on the social, cultural and political contours of the time but does not directly address medical or scientific influences. Other reviews have dealt with aspects of Wesley's interest in science but his legacy in science remains largely unexamined.

The Written Word

Wesley was an avid reader and producer of literature. Over the period 1733–1791 he and his brother Charles produced about 450 works in more

25 *Ibid.*, (16), 'Thoughts on Necessity', vol. X, 469–70.

26 *Ibid.*, 'A Thought on Necessity', vol. X, 475.

27 *Ibid.*, 474.

28 Hempton, D. *Methodism and Politics in British Society, 1750–1850*, Stanford: Stanford University Press (1984), 21.

29 *Ibid.*, 22.

30 Holifield, E. B. *Health and Medicine in the Methodist Tradition*, New York: Crossroad (1986), 12–14. See also Ott, P. W. 'John Wesley on Mind and Body: Toward an Understanding of Health as Wholeness', *Methodist History* (1989), 27, 61–72.

31 Holifield, *op. cit.* (30), 22.

32 Baker, F. 'John Wesley, London Publisher, 1733–1791' in Gibbins, R. C. (ed) *What Hath God Wrought*, London: Grenville Publishing (1988), 30.

than 2000 editions with an estimated 4,000,000 copies.³² He produced inexpensive and readable literature and required his preachers to study such secular subjects as natural philosophy, logic, geometry and psychology and act as book agents (at low commissions) in their itinerant ministry.³³

Brantley has concluded that Wesley and fellow intellectual associates such as Rev. Vincent Perronet, vicar of Shoreham (dubbed Archbishop of Methodism by Charles Wesley), Rev. Samuel (Sammy) Furley, Rev. William Romaine, and Rev. George Storey, Editor of the *Arminian Magazine* (AM) after Wesley's death led 'an auspicious beginning of the well informed but middle class audience to which belles-lettres were addressed'.³⁴ Wesley was well aware of this group. He defended his inclusion of scientific materials in the AM as part of a deliberate effort to direct ten percent of editorial material to a more literate audience.³⁵

Wesley's first scientific work *The Desideratum: Or, Electricity made plain and useful* (1759) summarized the work of Benjamin Franklin, Newtonian Benjamin Hoadley, Worcester Cathedral lay clerk Richard Lovett and other contemporary 'electricians'.³⁶ Joseph Priestley (himself an author of a book on electricity in the next decade) praised his work.³⁷ Wesley's primary interest lay in the potential use of electricity in medicine. He announced his intention to offer electrotherapy services in late 1756 and established four London stations for such treatment in the next two years in which 'hundreds, perhaps thousands received unspeakable good'.³⁸ Wesley's work preceded the use of electrostatic therapy in a London hospital at the Middlesex Hospital in 1767, and St. Bartholomew's Hospital in 1777.³⁹ Late 19th century London's marketing strategists chose the *Wesley Naturalist* for a series of 1889 advertisements touting the value of electrotherapy.⁴⁰ An early 20th Century work *Rontgen Rays and Electro-Therapeutics* pointed out Wesley's pioneering role in the field.⁴¹

Wesley's major work on natural philosophy *Survey of the Wisdom of God in Creation: A Compendium of Natural Philosophy* began as a two volume work in the first edition of 1763, and had expanded to five volumes by the 1777 edition. After his death numerous English and American

33 Crowther, J. *True and Complete Portraiture of Methodism*, New York (1813), 270. Wesley works on sale at London's Wesley Chapel included *Primitive Physic* (1 shilling) and *Survey of The Works of God in Creation* (5 vol at 1 L).

34 *Ibid.*

35 *Preface, Arminian Magazine* (1785), VIII.

36 Rogel, S. J. 'Electricity: John Wesley's Curious and Important Subject', *Eighteenth-Century Life* (1989), 13, 79-90.

37 Priestley, J. *The history and present state of electricity, with original experiments*, 2nd edn., London (1769), 3, 10, 48, 56, 393.

38 Wesley, *Works*, op. cit. (16), vol. II, 311, 388, 389.

39 Kassabian, M. K. *Rontgen Rays and Electro-Therapeutics*, Philadelphia: J. B. Lippincott (1906), xiii.

40 *Wesley Naturalist* (1889), 3, January, back cover.

41 Kassabian, op. cit. (39) xxxi.

editions were produced.⁴² The post-Wesley editions were extensively revised to reflect scientific advances and excise comments that offered ammunition for Wesley's critics. The subject matter covered the entire range of scientific interest from inorganic to organic—from polyps to stars—with a deliberate focus on facts rather than interpretation.⁴³ The first edition offered an abstraction from the Latin work of Jena University Pietist John Francis Buddoeus' *Elementa Philosophiae practicae et theoreticae* (1703) plus supplementary notes taken from John Ray's *Wisdom of God in the Creation* (1691), Dr. William Derham's *Physico and Astrotheology* (1713), Bernard Niewentyt's *Religious Philosopher* (1715), and Cotton Mather's *Christian Philosopher* (1721), packaged in a style 'as plain and clear, as the nature of the things spoken of will allow: although some of them, I know, will not be understood by an unlearned or inattentive reader.'⁴⁴ Schofield assessed the work in the following terms.

There were at that time numerous books giving better treatments of the special branches of science contained within the Survey; astronomy, mechanics, electricity, even chemistry and biology, were presented more adequately on a better basis. Were there, however, better treatments of these subjects combined in one book and sold as cheaply and as conveniently? It would not be easy to find them.⁴⁵

The Survey represented Wesley's commitment to help his constituency keep up with the intellectual tide of his day—supplying 'useful' knowledge circumscribed by a Christian worldview. Wesley worked steadily on various editions of his Survey over a period of three decades but was disappointed in the sales of the four editions issued over his lifetime.⁴⁶

Wesley may have been a victim of both bad timing and a negative image. His lack of scientific credentials and public criticism of some of his statements on astronomy may have damaged his credibility. Jonathan Topham has argued that late 18th and early 19th Century efforts to educate the working man resulted in more books reaching the *petite bourgeoisie* than the targeted audience.⁴⁷ The audience for the apologetics works of William Paley (1892–3) and the *Bridgewater Treatises* (1833–26) was far

42 Wesley, J. *Survey of the Wisdom of God in Creation: A Compendium of Natural Philosophy*, 2 vols., London (1763). The second edition (1770) added a volume of new material. The third edition (1777) occupied five volumes and included abridgements of C. Bonnet's *Contemplation of Nature* (1764) and Deuten's *Inquiry into the origin of the discoveries attributed to the moderns*. The fourth edition (1784) contained minor corrections. The third American (1823) in two volumes was revised by B. Mayo. The three volume London version by R. Mudie (1840) was characteristic of the post-Wesley versions in being faithful to both the intent and order of presentation of the author but updated to reflect scientific advances.

43 Wesley, *Works*, op. cit. (16), vol. XIV, 301.

44 *Ibid.*

45 Schofield, op. cit. (4), 337–8.

46 Wesley, *Arminian Magazine* (1784) VII, 4 admitted that one motive for publishing short extracts of his Survey was to promote greater sales of his scientific work.

47 Topham, J. 'Science and popular education in the 1830s: the role of the *Bridgewater Treatises* (1992), *British Journal for the History of Science*, 25, 399.

fewer numerically in Wesley's day and less likely to be in contact with his book salesman circuit riders. The burgeoning middle class after the turn of the 18th Century may have provided the incentive for Wesley's successors to prepare the numerous Survey revisions which appeared after his death.

While many 'Wisdom of God' works emphasized theology over scientific content, this was not the case for the Survey whose science was organized (if sometimes burdened with minutiae and unusual phenomena) and comprehensive. Wesley's work bolstered faith against skepticism but avoided 'scriptural' natural theology and a reading of nature in religious terms.⁴⁸ Wesley held a limited 'soft' form of natural theology which recognized the ultimate primacy of scripture in leading mankind to God which followed the lines of Aquinas and Calvin rather than Ray or Paley. Wesley never felt it necessary to develop a systematic statement on natural theology because of his own disinclination for systematic theology in general, his conviction that the traditional proofs for God were not convincing and the commonly held view that natural theology required no defence.⁴⁹

The Survey was used at his schools for boys and girls and included in the works assigned to his lay preacher. His *Journal* records a series of Saturday morning sessions working through the Survey with his London preachers.⁵⁰ Wesley's *Philosophy* as the Survey was popularly known and Paley's *Natural Philosophy* saw use in America as part of an 1827 selection of works that Illinois Conference Methodist circuit riders were expected to study and discuss with their senior pastor mentors.⁵¹

Richard Watson (1781–1833), the first Methodist systematic theologian, dealt with numerous science related religious issues in his *Theological Institutes* (1823). Watson appealed to the natural theologies of Samuel Clark, William Paley and Dr. Beattie rather than Wesley's Survey possibly because Wesley's 'soft' natural theology could not be used to argue a thorough-going case.⁵² Early Methodism's other scholar Dr. Adam Clarke (1772–1832) laced his sermons on creation, providence and the attributes of God with extensive doses of natural history, astronomy and natural phenomena but did not mention Wesley's Survey.⁵³

Wesley was willing to let 'secular knowledge' stand without insisting

48 Brantley, R. E. *Wordsworth's 'Natural Methodism'*, New Haven: Yale University Press (1975), 144ff. discusses the approaches of James Hervey and John Newton.

49 Hendricks, *op. cit.* (31), 13.

50 Ward, W. and Heizenrater, R. (eds.) *The Works of John Wesley, Journals and Diaries IV*, Nashville: Abingdon Press (1991), vol. 21, 494.

51 Bucke, E. S. *History of American Methodism*, New York, (1964), vol. 1, 534. The *American Methodist Magazine* (1828), 11, September inside back cover advertised Wesley's *Philosophy* at \$4.00 for the three volume set.

52 Watson, R., *Theological Institutes*, (1823), 23rd edn., New York, 1850, vol. 1, 243–262 and 359–371.

53 Clark, A. *Discourses on Various Subjects Relative to the Being and Attributes of God and His Works in Creation, Providence, and Grace*, London, 1865, (1st ed 1828), vol. 1, 15–31; vol. 2, 323–353, 293–331, 367–414; vol. 4, 55–68, 184–207.

on a natural theology link in every paragraph. He sought to provide an inexpensive non-theoretical general treatment of science which looked at the world as exemplifying the attributes of God.

Arminian Magazine

Wesley founded the *Arminian Magazine* in 1778 to promote the ideas and activity of English Methodism to a wider community than was reached by his other publishing ventures.⁵⁴ One prominent feature was the inclusion of original short articles on natural history or portions from the 1777 edition of his *Survey* often under the heading 'The Wisdom (or Works) of God Displayed in Creation'. The intrusion of the natural realm into a religious magazine did not sit well with all his readers. In answering one critic this 'enthusiast' for science responded that he could not ignore the fact that the *AM* reached ten times as many people as his *Survey*.⁵⁵ He encouraged his constituency (especially foreign missionaries) to send accounts of unusual natural history. These short pieces and abstracts served to display the wisdom and the providence of God, or were offered as information and for the enjoyment of the reader. In providing space for natural history Wesley was a precursor of later 19th Century movements for working-class education.⁵⁶

The *AM* regularly included letters of significance to Wesley or the Methodist movement. The February 1779 issue printed a 1748 letter from his friend Dr. J. Robinson of Pitcomb which reflected the essence of how Wesley would view the natural world.

Natural philosophers busy themselves about two things, the history of facts and the causes to effects. No man I think can with any reason pretend to the second, til he has enriched his memory with a large flock of natural history; which alone, if we should never get further is very profitable for life and godliness, teaching us many things useful in common life; and creating in an attentive mind, a high reverence for the creator, whose power, wisdom, goodness and the considerate view of the creatures very sensibly demonstrates and more feelingly than abstract reasonings. It seems to me too arduous a task for such short sighted creatures to finish the second task nor have I been able to persuade myself for many years past, that the main springs of the divine machine can ever be discovered by any mortal, or understood by any means but the revelation of the Divine Archateck.

Therefore, the world-builders have all lost their credit long ago, save

54 Wesley, *Works*, op. cit. (16), vol. XIV, 278–293. Bebbington, op. cit. (1), 68 notes 7000 subscriptions by 1791. Wesley modeled the *AM* after Dr. William Dodd's *Christian Magazine* (1760–67) including a series 'Physico-Theology or the Wonders of GOD in Creation' which followed a similar approach of Dodd.

55 Preface, *Arminian Magazine*, (1785) VIII, 4.

56 Topham, J. 'Science and popular education in the 1830's: the role of the Bridgewater Treatises', *British Journal for the History of Science*, (1992), 25, 399.

Sir Isaac Newton, who yet survives; but how near his end may be, is hard to tell. I say this of his general system; for his experimental history of light and colours and his mathematical reasonings on it, I think will stand the test. As little can I commend any hypothesis in physic, which is a part of natural philosophy, as on the whole of it. Reason and reflection are as necessary to cure diseases well, as experience and observations. But speculatively-given physicians are apt to reason too subtly and so get out of their depth, and lose themselves—and their patients.⁵⁷

During Wesley's tenure as editor nature was presented on its own terms rather than as a heraldic or symbolic link to a religious concept so prevalent in such evangelicals as James Hervey and John Newton and later Romantic writers such as Coleridge and Wordsworth. Science was not used for moral tales or pious discourses and scriptural natural history played a minor role. Implicit in these descriptions, however, was the sense that the 'wisdom of God' was on display.

Following his death in 1791 the normal dose of natural history and miscellaneous science was greatly diminished. However, under the leadership of newly appointed editor Joseph Benson the (renamed) *Methodist Magazine* (1804) initiated a long-running series 'Physico or Natural Philosophy: Or A Display of God's Works Extracted From Sundry Authors' using materials from the *Encyclopedia Britannica* and Paley. While the type and style of the abstracts followed Wesley's approach, his scientific writings never appeared again. After Wesley the AM was more inclined to emphasize the devotional function of a theology of nature.

American Methodists first published their *Methodist Magazine* (New York) in 1818. True to Wesleyan form, the new publication began a six-part series of short science articles under the heading 'The Attributes of God Displayed.' The first issue saw articles 'Contemplation of the Starry Heaven' (extracted from Sturm's *Reflections*)⁵⁸ and 'The Care With Which Providence Takes Care of Animals During the Winter Season'.⁵⁹

Sermons

Wesley's published sermons offer a wide range of topics through which he employed contemporary science to extend and complement the biblical message. The audience for the sermons went beyond the common folk of the country and he felt it important to incorporate scientific ideas as they related to such Biblical doctrines as creation, the fall, the end times, the flood, God's activity in nature, the soul, and the trinity. On occasion he would use scientific concepts to help explain difficult theological ideas.

The sermons have been published in innumerable editions and were

57 *Arminian Magazine* (1779), II, 89–91.

58 *Methodist Magazine*, New York (1818), 1, 22–3.

59 *Ibid.*, 22–3.

incorporated in *The Works of the Rev. John Wesley, M. A., Late Fellow of Lincoln College, Oxford* (1771–1774). Many were first published in the AM. The *Sermons* became a staple of the libraries of his preachers and educated laymen in succeeding generations insuring that the values that he saw in contemplating nature would endure. An 1870 *Westminster* review article would chastise Methodists for their alleged antagonism to modern science placing the blame in part on their adherence to the out-dated cosmogony in Wesley's *Sermons*.⁶⁰

The Living World

The Eighteenth Century saw a re-alignment of life science to form the discipline of biology. Natural history had focused on description and classification of living things while the experimental disciplines such as physiology were part of physics. An expanding core of naturalists, new discoveries and methodologies and changing religious interpretations of the organic world kept the scholarly pot boiling. John Wesley followed these developments with a keen eye. He recorded many details of the new findings in his *Survey* but carefully avoided theoretical discussion in line with his goals for the work. However, his other writings demonstrate that he paid close attention to theoretical developments especially where they touched animal physiology and medicine.

One major question touched on earlier in this paper involved reproductive mechanisms. Since the late 17th century, preformation theory had ruled the day. Preformationists held that all germs from which all organisms would ever be developed, had preexisted since the Creation, where they had been directly created by God. Encased within each other, they existed in the first member of each species—evidence of God's design which offered a bulwark against atheistic materialism.⁶¹ Charles Bonnet, discoverer of the parthenogenesis of aphids was one of preformation's strongest defenders. On the other hand, a *self-created* nature based on active matter would exhibit no preordained order and would need to be explained in a way which excluded God. This option drew more attention with the new observations of microscopic creatures by Abraham Trembley (1710–1784), Georges Louis de Buffon (1707–1788) and the English Catholic priest, John Needham (1713–1781).

Trembley had discovered the surprising property that polyps cut in pieces could generate an entire new polyp from any severed part. Materialists interpreted this and similar observations to prove that the properties of life were distributed throughout matter and that animals either had no soul or a huge number of souls waiting to appear when the regeneration process would be repeated.

Buffon drew on the new microscopic data to argue that all matter

60 J. E. T. 'John Wesley's Cosmogony', *Westminster Review* (1870), 94, 310–311.

61 Farley, J. *The Spontaneous Generation Controversy From Descartes to Oparin*, Baltimore: Johns Hopkins Press (1977) especially chapters 2 and 3.

contained a material which was particulate and active. These unique *molecules organiques* directed by a *moule interieur* cycled through living systems in an unending process of generation, growth and decay. Reproduction involved the spontaneous organization of organic particles into living beings.

Wesley commented on Needham's observation of spontaneous generation in a July, 1758 *Journal* entry: 'the tract confounded all my philosophy' but agreed that it was 'highly probable' that this 'particular class of animals' existed.⁶² Many years later he read the early volumes of an Edinburgh translation of Buffon's multivolume *Histoire naturelle* (1749–1789). He responded with a caustic review 'Remarks on The Count De Buffon's "Natural History"' (1782). Wesley dismissed the first volume with the comment 'the Count's theory of the earth is wild and whimsical enough, but it is innocent'.⁶³ The volume on animal behavior received his total disapproval. At issue was Buffon's belief that 'every part of every animal or vegetable contains a germ or embryo of the same species which may be expanded to a whole of the same kind'. While Wesley accepted the unusual behavior of polyps, the lack of other examples led him to conclude that Buffon's theory had no 'foundation' and would lead [for unspecified reasons] to atheism.⁶⁴ Wesley had plenty of company among British naturalists of his day who generally opposed spontaneous generation, brushing aside the experimental arguments in favor of religious presuppositions demanding a Creator.⁶⁵

Wesley enthusiastically embraced the religious and scientific ideas of Swiss naturalist Charles Bonnet and included a 225 page abridgement of his *The Contemplation of Nature* (1764) in the 1777 edition of the *Survey*. A major attraction of Bonnet for Wesley was his emphasis on the image of 'the scale of beings' (also called the great chain of being or the scale of nature). Wesley repeatedly used the scale of being in emphasizing the unity and connectedness of creation and 'the adorable Perfections of the First Cause'.⁶⁶

Wesley lived in a time when many Christians assumed a literalistic Biblical picture of a 'once for all' creation about 4000 BC. Wesley distanced himself from a Mosaic Geology noting the 'inspired penman in this history [Genesis] . . . wrote for the Jews first and calculating his narratives for the infant state of the church, describes things by their outward sensible appearance, and leaves us, by further discoveries of the divine light, to be led into the understanding of the mysteries couched under them'.⁶⁷ Yet he was pleased that the 'Biblical and scientific accounts agreed'.⁶⁸

62 Ward and Heizenrater, *op. cit.*, vol. 21, 159.

63 *Ibid.*, 452.

64 *Ibid.*, 454.

65. Farley, *op. cit.* (61), 43–45.

66 Wesley, *Survey* (1784), *op. cit.* (42) vol. 4, 61.

67 Wesley, J. Wesley's *Notes on the Bible*, Grand Rapids: Zondervan (1987), 25.

68 Wesley, *Survey* (1777), *op. cit.* (42), vol. 2, 463.

Wesley often linked earth history with the themes of man's probation and redemption. He supplemented the Biblical narrative with speculations on the physical and biological features of the earth prior to the 'Fall' and the 'Flood' and in the future 'New Heavens and New Earth'.⁶⁹ His fullest exposition of the creation period is found in the sermon *God's Approbation of his Works* (1782).⁷⁰

Every part was exactly suited to the others, and conducive to the goods of the whole. There was a 'golden chain' (to use the expression of Plato) let down from the throne of God—an exactly connected series of beings, from the highest to the lowest; from the dead earth, through fossils, vegetables, animals, to men created in the image of God.⁷¹

The Survey reflects his conventional Biblical view.

In the beginning of time and nature, at the command of God, the earth brought forth plants and herbs, and four footed animals in their various kinds . . . birds of the air . . . fishes produced by the same command.⁷² It is no wonder that a God who could create such astonishing and exquisite plants and animals, as to nourish and preserve the individuals, as well as to propagate the species, through all ages to the end of time.⁷³

One early Wesleyan interpreter, minister Samuel Thompson (1830) found 'the wonderful gradation in the scale of being a noble key to open to us the invisible scenes of Nature and Providence.'⁷⁴ Paraphrasing Wesley, he sees 'beings ascend(ing) to the highest point of perfection'. 'Who can tell where the insensible and rational begin and the sensible and irrational end.'⁷⁵

Other Wesley associates, Richard Watson and Adam Clarke held similar views.⁷⁶

Antivivisection

John Wesley's 'cherished peculiar views on animals' have had an enduring influence on English attitudes and an unexpected effect on the way that anatomical research was carried out in the early 19th century.⁷⁷ 18th century Christendom sponsored a lively debate over the moral status of animals. Inheritors of a biblical tradition saw man as made in the image of

69 The theme of creation especially prominent in Wesley's *Sermons*, No's 15, 44, 56, 57, 69, 77, 120, 141 in op. cit., Outler (11), vols. 1 through 4.

70 *Ibid.*, vol. 2, 387–399.

71 *Ibid.*, 396–7.

72 *Arminian Magazine* (1789), XII, 80.

73 *Ibid.*, 194.

74 Thompson, S. *Essays Lending to Prove Animal Restoration*, Newcastle (1830), 180.

75 *Ibid.*, 181.

76 Grant, C. 'Evolution and Darwinism in the Methodist Quarterly Review', 1840–1870, *Methodist History* (1991), 29, 175–183. See also Numbers, R. 'Creation, Evolution, and Holy Ghost Religion: Holiness and Pentecostal Responses to Darwinism', *Religion and American Culture* (1992), 2, 127–158.

77. Southey, R. *Life of Wesley* (1847), New York, vol. 2, 79.

God elevated to a status between 'the beasts' and the angels. Man as lord of creation was superior to the other creatures through his speech, reason and immortal soul. 17th century Cartesian scholasticism viewed animals as mere machines whereas man was endowed with a mind (soul).⁷⁸ Wesley's day saw a revisionist onslaught on the separation between animals and man. Debates on the ability of animals to reason and accounts of animal sagacity by pet owners testified to the uncertainty of man's superiority. Basic to the question was the hope for a future (better) life for animals consistent with the assumption of 'animal souls.' Advocates of the possibility of animal resurrection included such luminaries as Bishop Butler, William Whiston, David Hartley, theologian Matthew Henry and Methodists Adam Clarke and John Wesley.⁷⁹

Wesley's first recorded interest in animals was found in his 1727 Oxford Masters of Arts oration 'De Anima Brutorum' which has not survived him.⁸⁰ His sermon *On the Education of Children* (1783) admonished parents to teach their children not 'to hurt or give pain to anything that has life' or 'much less to kill anything without necessity'.⁸¹ 'Let them extend in its measure the rule of doing as they would be done by to every animal whatsoever,' rhetoric which would sound an enduring note.⁸²

The Great Deliverance (1781) contrasted the present quality of existence for animals with their pre-fall state and that in the world to come based on the text Romans 8:19–22. He argued that pre-fall animals embodied some measure of the qualities of man-self-motion, a will, liberty, and understanding.⁸³ He agreed that the fall affected animals but that they 'shall be delivered from the bondage of corruption into glorious liberty; even a measure, according as they are capable, of the liberty of the children of God'.⁸⁴ God 'has a tender regard for even his lowest creatures, and that in consequence of this he will make them large amends for all they suffer while under their present bondage'.⁸⁵

Richard Watson, the first Methodist systematic theologian, had mixed feelings about Wesley's views on animals.

It is granted that on the premises laid down, not only must an immaterial principle be allowed to man, but to all animals possessed of volition; and few, perhaps none, are found without this property . . . it

78. Thomas, K. *Man and the Natural World: changing attitudes in England 1500–1800*, Harmondsworth: Penguin (1983), 33.

79. *Ibid.*, 140.

80. Tyerman, L. *The Life and Times of John Wesley, M. A.*, London: Hodder and Stoughton (1870), vol. 1, 154.

81. Outler, *op. cit.* (11), vol. 3, 360.

82. *Ibid.*

83. *Ibid.*, vol. 2, 440.

84. *Ibid.*, 445.

85. *Ibid.*, 447.

is perfectly in accordance with Scripture, which speaks of the soul of the beast, as well as of the soul of man.⁸⁶

Watson, however, drew the line on animal immortality.

God hath given this privilege to man, not by a necessity of nature, which would be incompatible with dependence, but by his own will, and the continuance of his sustaining power. But he seems to have denied it to inferior animals, and according to the language of Scripture, the spirit of the beast goeth downward.⁸⁷

Not so for Wesley adherent Samuel Thompson (1830) who cited Job xii:10 (King James Version) that 'every living being has a soul' to support his contention that 'Every kind of life through the universal system must necessarily be immortal'.⁸⁸ He closed his case for a future animal restoration by reprinting Wesley's sermon *The Great Deliverance*.

Adrian Desmond's *The Politics of Evolution: Morphology, Medicine and Reform in Radical London* (1989) records the role that Wesleyans and other like minded evangelicals of the London medical community of the 1830's and 40's played in opposing vivisection and animal mutilation.⁸⁹ Wesley's sermons sold at the bargain price of 3p/100 by the RSPCA offered a rallying point for the Medical Dissenters on the fringes of the London medical establishment.⁹⁰

These medical dissenters sought to stop cruelty and blood sports because of their distinctive understanding of animal existence—as conscious, suffering, even immortal. A new interest in the moral issue of pain in nature carried over to discussions on experiments with living animals. As a result of these concerns the animal welfare supporters adopted anatomical approaches that avoided dissection of living animals and, instead, developed a lineal developmental model for zoology which traced organ growth from monad to man. The chain of being (so prominent in Wesley) presented a natural series of 'experiments' which avoided the need for the knife. 'The new image of higher anatomy as humane, safe, and sure had a strong appeal in an age worried that man's works were daubing blood on God's Word'.⁹¹

Recent Christian animal rights advocates such as Andrew Linzey (1987) and Keith Thomas (1982) continue the tradition of using Wesley's sermons

86. Watson, *op. cit.* (52), vol. 1, 353.

87. *Ibid.*

88. Thompson, *op. cit.*, (74) 2.

89. Desmond, A. *The Politics of Evolution: Morphology, Medicine and Reform in Radical London*, Chicago: University of Chicago Press (1989), especially pp. 166–192.

90. *Ibid.*, 184.

91. *Ibid.*, 192.

to support animal immortality, arguing that God's concern for the welfare of his creatures should be reflected by His 'image bearers'.⁹²

Methodists With Lens And Test Tube

One late 19th Century Wesleyan venture brought about the formation of the Wesley Scientific Society and a monthly journal *The Wesley Naturalist* (March 1887). This ambitious (but short lived) program of popular enlightenment would 'promote intercourse among students of science, especially as belong to the Wesleyan Church; to encourage practical scientific work among amateurs; give help and guidance to beginners in the study of natural history; and promote the collection and circulation of useful facts and observations bearing upon the sciences in general'.⁹³

This self-help approach was to be carried out under the supervision of 'referees' expert in such diverse areas as photography, paleontology and microscopy. Materials were circulated by mail. Field trips to study botany, geology and zoology were organized. Attendance at meetings in the Wesley Centenary Hall and Science Museum in London provided opportunity for participation by the major figures in the society and drew as many as 200 participants. The President of the Society and Journal editor was the Rev. William Henry Dallinger, LL.D., F.R.S., Pres. R.M.S., F.L.S., &c. (1842–1909). Dallinger and the other organizers turned to Wesley to baptize their efforts noting 'how eagerly he studied and ultimately taught the newly realized and ever expanding science and interpretations of his age'.⁹⁴ Dallinger used Wesley's comparison of the 'finest needle with a bee sting seen under a microscope' in a lecture where he showed a microscope slide of a bee sting alongside the point of one of the finest cambric sewing needles, 'thus demonstrating how poor was man's skill in finish and form, in comparison with the exquisite perfection of the Creator's handiwork'.⁹⁵ The enterprise had a modest financial base and depended wholly on volunteers to run the distribution machinery and *Journal*. In spite of enthusiastic initial interest the founders ran out of the money and energy required to keep things going. *The Wesley Naturalist* merged with *Journal of Microscopy and Natural Science* in 1890 and disappeared two years later. Andrews argues that the Wesley Scientific Society saw itself in the main stream of Methodism and included as referee in marine zoology the Rev. Nehemiah Curnock, editor of the standard edition of Wesley's *Journal*.⁹⁶

92. Linzey, A. *Christianity and the Rights of Animals*, New York: Crossroad (1987 p 38 draws on Wesley to argue 'the hope of redemption for man and animal'. Thomas, op. cit. (97), 202 views 'immortality for animals as well as humans, (as) a necessary condition for any theodicy'. Wennberg, R. 'Animal Suffering and the Problem of Evil', *Christian Scholar's Review* (1991), XXI., 120–141 and Barclay, O. 'Animal Rights: a Critique' (1992), *Science and Christian Belief* 4, 49–62 offer current evangelical views.

93. *The Wesley Naturalist* (1887), 1, 3.

94. *Ibid.*, 2.

95. Recorded in Andrews, S. 'The Wesley Naturalist', *History Today*, (1971), 814.

96. *Ibid.*, 817.

Conclusion

John Wesley was unique among 18th century evangelicals in offering a broadbased but nuanced evangelical 18th century response to science. The public image of Methodist anti-intellectualism and evangelical squabbles over theology kept his ideas from a broader audience. His work suffered from his tendency to develop ideas in response to specific situations rather than in cohesive formal presentation. This distaste for theological systems helped to keep science and religion in separate enclaves. His openness to new scientific ideas may have helped Methodists to face the Darwinian challenge without the controversy found in other religious bodies.

Wesley's spiritual progeny used his words and deeds to serve causes which would have warmed his heart, amazed him or drawn his ire. His influence in matters related to the natural sciences reaches to the late 20th Century. He affirmed the value of the natural sciences in general as well as theological education, the alleviation of suffering and support of the Christian faith yet offered a dissenting note for those who would advocate a materialistic 'theory of everything'

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