High Church Science: William Swainson and William Kirby

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Defending the eighteenth-century Church of England against charges of complacency, torpor and indifference to education might seem a quixotic enterprise, not to be lightly or wantonly undertaken. The Evangelicals of the early nineteenth century, and the Oxford high-church Tractarians a generation later, would seem to be agreed at least on that point. Only when the broad-church *Essays and Reviews* was published in 1860 did the task of rehabilitating, or understanding, this part of the past begin. In that scandalous collective volume, which introduced biblical criticism to the great British public[1], Mark Pattison wrote sympathetically on 'Tendencies of Religious Thought in England, 1688-1750'[2], while Frederick Temple discussed 'The Education of the World'. The ballyhoo from the clergy (with Soapy Sam Wilberforce promoting heresy charges against some authors) was so appalling that Temple remained somewhat anti-clerical even when in due course he became Archbishop of Canterbury.[3] If not exactly against general education, certainly churchmen had been uneasy about educating foundlings, or indeed most children; and were also manifestly not ecumenically-minded; and their successors were ashamed about the former, if not the latter.

England like Aberdeen had only two universities until 1832, when Durham and then London received their charters: it was a poorly-educated nation, anyway insofar as the national church was responsible for it. Conscientious Dissenters could not attend Oxford or Cambridge, where attendance at college chapels was compulsory, and subscription to the thirty-nine articles of Church of England doctrine required at some point. indeed, well into the nineteenth century these universities were in effect seminaries, with over half their students aiming at ordination – for the others, they were finishing schools. There were scholarships which enabled some very able boys to follow the route of social mobility mapped out long before by Cardinal Wolsey, from a cottage to a bishopric or other high office: the church was in part a meritocracy. But this was very different from educating every ploughboy, raising expectations which to the conservative-minded could never be fulfilled and must issue in frustration and social upset. After all, until the eighteenth century there had seemed no good reason to think that there could ever be significantly more white-collar jobs: most people were going to have to work on the land, or in long-established crafts, or join the army or navy. Most boys were expected to follow their father's occupation: the exceptional ploughboy might get to university, and enter one of the three traditional learned professions, the church, the law or medicine – but the sons of clergy, lawyers and doctors would be denied their reasonable expectations if significant numbers from the lower orders were to be educated beyond their station.

These doubts were not unreasonable. Right through the nineteenth century the medical profession was overfull in Britain, with many doctors like the young T. H. Huxley (who solved the problem temporarily by joining the Navy) having trouble in making ends meet; and when Bishop Van Mildert, founding the University of Durham, wrote to his fellow-bishops asking if they would undertake to ordain suitable Durham graduates, the Bishop of Rochester grumbled that the clerical profession was already overstocked.[4] As everyone knows from literature, there were certainly impoverished curates without any reasonable expectation of ever getting a 'living

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1 See Thomas Hardy's poem, 'The Respectable Burgher, on the Higher Criticism', in D. Karlin (ed.), *The Penguin Book of Victorian Verse* (London: Penguin, 1997), no. 270.

2 M. Pattison, *Memoirs of an Oxford Don,* ed. V. H. H. Green (London: Cassell, 1988).

3 E. G. Sandford (ed.), *Memoirs of Archbishop Temple* (London: Macmillan, 1906), vol. 2, pp. 419, 613: my copy was Bishop Hensley Henson's, and he has annotated p. 419 'very few Clergymen will be saved' which Temple quoted from St Chrysostom.

4 E. A. Varley, *The Last of the Prince Bishops. William Van Mildert and the High Church Movement in the early 19th century* (Cambridge: CUP, 1992), p. 153.

as a comfortably well-endowed rector or vicar: until the Ecclesiastical Commissioners were set up after the Reform Bill of 1832, the church was a lottery with some plum prizes and many duds.[5] We know that in other spheres, notably where Dissenters were strong, expansion of the economy was going on: industry and commerce required managers, mechanics and clerks, and new professional groups like engineers and actuaries came into being. In great industrial cities where the church's parochial system could not keep up with growth, Newcastle-upon-Tyne for example, Unitarians were prominent in setting up Literary and Philosophical Societies to diffuse high culture among the new middle class at the end of the eighteenth century;[6] and in London the Unitarian chemical manufacturer Samuel Parkes urged in his Chemical Catechism (1807) that such parents should teach their sons science to prepare them for careers in industry. At Oxford and at Cambridge in the 1780s, lectures on chemistry given by Dr Thomas Beddoes and by (the future Bishop) Richard Watson had attracted huge audiences, though they formed no part of the actual syllabus – which consisted of classics, and an insular, Newton-worshipping, kind of mathematics. But this chemistry can be seen partly as what on the Continent would have been called cameralistics, preparation for grandees to administer estates including mineral riches;[7] and partly as intellectually exciting stuff that a well-educated person ought to know something about. Davy's amazingly successful lectures to the ladies and gentlemen at the Royal Institution in the first decade of the nineteenth century fit the same pattern.

We may be familiar with the Unitarian Joseph Priestley's denunciations of established churches, and the separation of church and state prominent in the thought and practice of his Deistic friends Benjamin Franklin and Thomas Jefferson; but it was possible to support establishment even if one were a cool and sensible sceptic,[8] worldly wiseman perhaps, rather than a keen churchman. Enthusiasm aroused great alarm in the late eighteenth century; and we should restrain our superior smile because it was equivalent to our dread of fundamentalisms and cults, and our unease about 'alpha' courses, 'Toronto blessings', happy-clappies and charismatics. An established church was important in part because with its formal liturgy, learned ministry and national position it canalised religious emotion into seemly and appropriate channels.[9] Seeing what was and is done in the name of unregulated religion, there was clearly much to be said for a respectable, if rather damp, Laodicean and Erastian establishment in which piety and good works could be encouraged.[10] But an established church has to be broad, able to incorporate as far as possible Calvinist and Arminian, evangelical and catholic, believers and doctrines.[11]It is a parochial church based on locality rather than a gathered church of people who are alike in class and in thinking; there is thus inevitably some fudging, an avoidance of clear and distinct ideas in favour of smudgier golden means, and an emphasis on method rather than chilly logic. The characteristic of most bishops in the Church of

5 *Report of the Commissioners ... [on] Ecclesiastical Revenues* (London: HMSO, 1835).
6 R. S. Watson, *History of the Literary and Philosophical Society of Newcastle-upon-Tyne* (London: Scott, 1897); D. Gardner-Medwin, A. Hargreaves & E. Lazenby (ed.), *Medicine in Northumbria* (Newcastle: Pybus, 1993); 1. Inkster and J. Morrell (ed.), *Metropolis and Province* (London: Hutchinson, 1983).
7 D. M. Knight, *Ideas in Chemistry. a History of the Science* (London: Athlone, 2nd ed. 1995), pp. 97 ff.
8 J. G. A. Pocock, *Barbarism and Religion,* 2 vols. (Cambridge: CUP., 1999), dealing with Edward Gibbon, his intellectual development and relationship to Voltaire and other philosophes.
9 J. R. Watson, *The English Hymn; a Critical and Historical Study* (Oxford: OUP, 1999), p. 171; and for Church/dissenter tensions, p. 338.
10 *Revelation,* 3, pp. 14-17
11 H. R. McAdoo, *The Spirit of Anglicanism: a Survey of Anglican Theological Method in the l7th century* (London: Black, 1965); on these various ecclesiastical terms, see F. L. Cross, *The Oxford Dictionary of the Christian Church* (Oxford: OUP, 19 57).

England has always therefore been a terror of rocking the boat:[12] peace and compromise are extremely important, even if harmony is not always attainable. On the other hand, offsetting this timid conformity, vicars and rectors had freehold and an assured income, and were almost impossible to remove: so they could and did behave and teach as they saw fit, even if to their bishop it did not seem right and proper, or to their flock it was odious.

Suspicion and sometimes hatred characterised relations between church and chapel in England right through the nineteenth century, and was crucial to understanding politics; both might unite in condemnation of Roman Catholics, and some collaborated in the British and Foreign Bible Society, but otherwise when relations in particular cases were good, this was seen as worthy of comment. The rivalry showed when the monitorial systems of Lancaster and Bell transformed elementary teaching as the Dissenters, and then the Church through its National Society, took seriously the education of the young in the opening years of the nineteenth century. Evangelicals within the Church like Hannah More were prominent in this movement. The two authors we shall be concerned with, William Swainson and William Kirby (a layman and a parson) were however high churchmen, in a tradition going back to the non-jurors of 1689 who (believing in the duty of passive obedience, and prepared to resign from their benefices) refused to repudiate their oath of allegiance to James 11; and continued in the eighteenth century by William Jones, of Nayland, an important figure in the Church although (as a Tory) never given high preferment.[13] Their books, written in the 1830s, were addressed to the new reading public which had recently come into being. The 1820s, with the revolution in book publishing brought about by steam presses, cheap paper made from wood pulp or esparto grass, wood-engraving, and publishers' casebindings, saw the March of Mind, or Intellect. The (Dissenters') Society for the Diffusion of Useful Knowledge competed with the (Church's) Society for the Promotion of Christian Knowledge in issuing little books for children and for adult readers; the coming of gas light made possible evening classes, and late opening of libraries at Mechanics' Institutes. The new readers were serious: small volumes, often duodecimo, with small type and narrow margins contained a lot of information for the avid inquirer in what to our generations would seem a rather unpalatable form (though the embossed case-bindings are fun).

Among the publishers involved in this revolution was Thomas Longman (1771-1842), who published a large set of little volumes called *The Cabinet Cyclopedia.* The general editor, an efficient recruiter and a man of parts, was Dionysius Lardner; some said sneeringly that his real (plebeian) name was Dennis, while others called him 'The Tyrant' after Dionysius of Syracuse (4th century BC, because he pushed his authors so hard. He was famous for declaring, just before it happened, that steam navigation across the Atlantic would never be possible because the ship would have to carry so much fuel that there would be no room for cargo or passengers; and also because he eloped to Paris with the wife of an army officer. The small octavo volumes in this series would together form an impressive non-fiction library; but they did not constitute an encyclopaedia, and they were not textbooks – there were no classes or syllabuses for which they were intended.[14] They were however aimed at those who wished to educate themselves, in this age of improvement and self-help. Among the authors Lardner recruited for Longman was Swainson, who undertook to write numerous volumes on natural history.

Swainson[15] was born in Liverpool in 1789, the son of a customs-officer. His father of course expected him to work in the customs-house also, but William developed a taste for travel and

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12 Don Cupitt, 'Face to Faith', *The Guardian,* Saturday 7 July 2001.

13 He and other worthies are to be found in J. W Yolton, J. V. Price and J. Stephens (ed.), *The Dictionary of Eighteenth-century British Philosophers* (Bristol: Thoemmes, 1999).

14 A. Lundgren and B. Bensaude-Vincent (ed.), *Communicating Chemistry. Textbooks and their Audiences* (Canton, MA. Science History, 2000).

15 On Swainson, see D. M. Knight, *Science in the Romantic Era* (Aldershot: Ashgate Variorum, 1998), pp. 197-224.

for natural history that led him instead to join the Commissary of the Army. In 1807 he was sent to Malta; and after the war ended in 1815 he elected to go on half pay. His time in the army, and his conviction that he belonged to a distinguished family that had gone down in the world, made him prickly and hard to deal with: he found it hard to keep a friend, and his life was punctuated with furious rows: 'bred up with somewhat of aristocratic notions, and accustomed, when on service, to command rather than obey, I had a rooted dislike of all commercial affairs, and would rather have gone once more on active duty than have sat behind a desk'.[16] He also suffered, like Priestley, from a speech impediment; his direct and offensive remarks therefore got down on paper, where they would be harder to forgive or forget. In 1816 he set out for Brazil; but unfortunately there was a war on, he barely got ashore, and his collections of specimens were sparse.[17] Nevertheless, on returning to Britain he was elected FRS; and he got to know William Leach, in charge of zoology at the British Museum, who encouraged him to take up the new art of lithography for zoological illustration. Here, a drawing was made on a suitable stone with a wax crayon: the stone was next wetted, and then inked with an oil-based ink which adhered to the wax, but not to the wet stone, so that a print could be made. This was much cheaper than engraving on copper, and moreover the artist could be in charge of the whole process, rather than having his drawing translated by a craftsman into the less-exuberant language of engraving. Swainson, a very talented artist, became the first person in Britain to publish works of natural history (on birds and shells) illustrated by lithographs, and he worked the system of publishing in parts.[18] What subscribers paid for part I would pay for the printing of part 2, and so on; and the overall price for what were superbly illustrated books seemed less daunting if spread over a year or two as the parts came out. The plates were hand coloured, and the 'pattern plates' coloured by Swainson for his team of colourists are at the Linnean Society in London; where there is also a splendid and very revealing archive of his correspondence.

In 1822 Swainson hoped to become Leach's successor: but the post went to J. G. Children, a chemist rather than zoologist, but a friend of Humphry Davy's (as PRS, a Trustee of the Museum) down on his luck after the failure of his bank. Disgruntled, and henceforward a grumbling and disappointed man, Swainson found that his inheritance from his father was scanty, and he would have to support himself and his family by pen and pencil. In 1833 he signed a contract with Longman to write fourteen volumes on natural history, of three hundred pages each, to be illustrated with woodengravings (lithography worked only for short runs, at the upper end of the market), and to be produced at the rate of one every three months, for £200 each: these were for Lardner's series, and indicate why he was called a tyrant. Swainson had been working for Longman on an aborted encyclopaedia, and thus had some material to hand, but even so the contract was wholly unrealistic; volumes nevertheless steadily if slowly appeared from 1834. The first was a *Preliminary Discourse,* for which the model was John Herschel's on natural philosophy in the same series – an accessible classic in philosophy of science.[19] At the outset, there are two features of it which deserve notice as a statement about scientific and religious allegiance: on the engraved title-page, where Herschel had a bust of Francis Bacon as founder of inductive philosophy, Swainson put Aristotle, whom he considered the founder of zoology, and the true discoverer of Georges Cuvier's law of the correlation of the

16 W. Swainson, *Taxidermy with the Biography of Zoologists* (London: Longman, 1840), p. 347: his own biography is the longest in the book, and the frontispiece is his portrait.

17 The forthcoming issue of the Brazilian journal *Historia Naturalis will* be devoted to papers from a conference on the science of travellers there since 1500; see also N. Jardine et al (ed.), *Cultures of Natural History* (Cambridge: CUP., 1996).

18 C. E. Jackson, *Bird Illustrators. some Artists in early Lithography* (London: Witherby, 1975), pp. 25-31.

19 J. F. W. Herschel, Preliminary *Discourse on the Study of Natural Philosophy*, [1830], reprint intr. M. Partridge (New York: Johnson, 1966).

parts of animals (which led to the reconstruction of fossils).[20] Lardner had written advising no bust, and especially not of Aristotle or John Ray: but Swainson did not mind standing up to tyrants, and one cannot but admire him for it.

Opposite the title page is a quotation from Jones of Nayland (where Herschel had again used Bacon, on man as the minister and interpreter of nature):

> The world cannot show us a more exalted character than that of a truly religious philosopher, who delights to turn all things to the glory of God; who in the objects of his sight, derives improvement to his mind; and in the glass of things temporal, sees the image of things eternal.[21]

This last sentence indicates how those in the high-church tradition might differ from Dissenters in their attitude to the natural world. Bacon had popularised the idea that there were two books, the Bible and Nature (that who runs may read), which together told us about the infinite wisdom and goodness of God. All Christians from whatever denomination might unite in that task of natural theology, and many did so: but there were problems. Natural religion might come to seem sufficient to stand on its own; with revealed religion, which ought to be the core of Christianity, as a bolt-on extra available for those who required it: as indeed it is in the Deist William Wollaston's *Religion of Nature Delineated* (1722 and later editions). The Cambridge churchman William Paley in his *Natural Theology* (1802) had revitalised the old idea of the world as a clock, and God the clockmaker; now refreshed with the recent invention of the chronometer – but the utilitarian philosophy essential to his rhetoric did not appeal to high churchmen, with Oxford as their intellectual centre. They would have agreed with some other orthodox Christian thinkers that arguing for God's existence and goodness (applauding Him for a good bit of design, and giving Him the benefit of the doubt over general happiness) was impertinent and presumptuous, and the wrong way to go about instilling faith – meaning real belief and trust in a personal God rather than notional assent to propositions. But they also emphasised sacraments and hierarchy, seeing the world as a glass on which one should not stay one's eye, but pass through and spy the heavens. For Swainson, the natural world was full of types and symbols: he noted that the crysalises of stinging caterpillars point downwards towards Hell, for example – a point which the evolutionist A. R. Wallace in his copy characterised first as 'mildly fanciful' and then later as 'going too far beyond common sense'.[22]

Going beyond common sense was something Swainson was seen as doing in the system of taxonomy that provided the organising principle for his books in Lardner's Cabinet Cyclopedia series. This was based upon trinities of circles where extremes met: at every level (species, genera, orders) there are three circles which include everything. These are labelled the Typical, the Subtypical and the Aberrant: this last one is itself divided into three little circles. The two big circles and three little ones make five, and so the system was called Quinary – which disguises its basis in threesomes. Swainson did not invent this system, but became its apostle. The Great Chain of Being, a ladder from amoebas up through all the links to mankind (and maybe on to angels and archangels), had been abandoned in the light of Cuvier's work; and animals were therefore classified in natural groups on Aristotelian lines, in an overall untidy pattern looking like a bushy, shrubby tree with four main stems. The quinary system with its levels provided instead an elegant and intelligible framework, and might even predict undiscovered creatures: it seemed a real key to the natural world (as the Periodic Table was later to be in chemistry). It aroused the interest not only of Wallace, but also of T. H. Huxley

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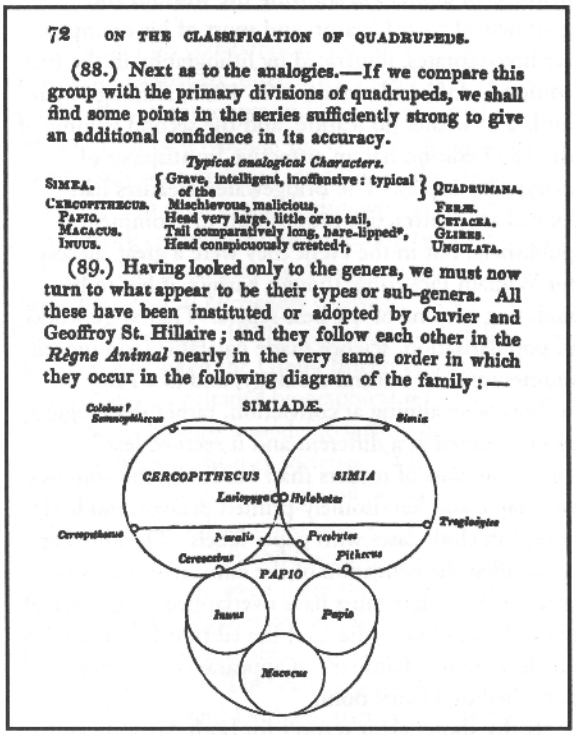
20 M. J. S. Rudwick, *Scenes from Deep Time. early Pictorial Representations of the Prehistoric World* (Chicago: Chicago UP, 1992).

21 *W.* Swainson, *Preliminary Discourse on the Study of Natural* History (London: Longman, 1834).

22 *W.* Swainson, *The Geography and Classification of Animals* (London: Longman, 1835), p. 248: Wallace's copy is at the Linnean Society – he evidently read it twice.

and Charles Darwin, who were fascinated but then repelled by so static and dogmatic a scheme; which also relied on subjective judgments of resemblances and affinities, rather than careful weighing of evidence from dissection as well as appearance and habits. After all, Swainson had undertaken to write a lot of books, on a wide range of topics, fast.

Readers of Swainson's little volumes would thus learn a lot of natural history, within a framework which (like Linnaeus') was based largely upon external characteristics – thus Swainson put the marsupial 'Tasmanian wolf' with the dogs rather than (with Cuvier, who took anatomy and physiology into account) in a quite different group near the kangaroos. The different books cover the geographical distribution of animals, and the lives of eminent naturalists; and include conchology (on which Swainson was an expert, and had done sumptuous lithographs) as well as vertebrate zoology. His Preliminary Discourse [1834] was more personal (not to say idiosyncratic) than Herschel's, and thus while it may well have kindled enthusiasm it never became a classic – it contains praise for Adam Sedgwick and his defence of natural theology, and urges more support for natural history from government and universities: in the controversies of the day he was a 'declinist', believing with Charles Babbage that British science was going downhill. Swainson's own grumbles come through in various places, notably in a footnote where he compares his own treatment with that of Bavarians who had explored Brazil (rather more thoroughly, though he does not say so).[23]



72 ON THE CLASSIFICATION OF QUADRUPEDS.

(88.) Next as to the analogies.—If we compare this group with the primary divisions of quadrupeds, we shall find some points in the series sufficiently strong to give an additional confidence in its accuracy.

Typical analogical Characters.

SIMEA.	Grave, intelligent, inoffensive: typical of the	QUADRUMANA.
CERCOPITHECUS.	Mischievous, malicious,	FERÆ.
PAPIO.	Head very large, little or no tail,	CETACEA.
MACACUS.	Tail comparatively long, hare-lipped*,	GLIRES.
INUUS.	Head conspicuously crested†,	UNGULATA.

(89.) Having looked only to the genera, we must now turn to what appear to be their types or sub-genera. All these have been instituted or adopted by Cuvier and Geoffroy St. Hillaire; and they follow each other in the *Règne Animal* nearly in the very same order in which they occur in the following diagram of the family:—

Extract from W. Swainson, *The Natural History and Classification of Quadrupeds*, new ed., London: Longman, 1845

In its search for hierarchical order, its delight in symbol and type, and its Trinitarian taxonomy, Swainson's series has a distinctively Church and Tory character. And the same is true of the Bridgewater Treatise of the eminent entomologist William Kirby. The series of

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23 W. Swainson, Preliminary Discourse, pp. 367 ff, 352.

treatises were funded by a legacy of the clerical earl of Bridgewater,[24] the eight authors being chosen by the President of the Royal Society (who took advice from prominent Churchmen). Most authors were liberal churchmen: the most successful books were probably those by William Whewell[25] on astronomy, and William Buckland on geology; but the Scottish Presbyterian Thomas Chalmers was a chosen author, and from the other end of the theological spectrum so was Kirby. He had with William Spence written a very attractive epistolatory work, *An Introduction to Entomology* [4 volumes, 1815-26], which had helped to make the study of insects serious and popular. His book was on the history, habits and instincts of animals as showing the wisdom and goodness of their Creator; and most of his examples are invertebrates, illustrated by lithography in the first edition (1835) and woodcuts in 1852; although men birds and whales do feature, and the second volume of the 1852 edition has an attractive frontispiece of platypuses at play. The Bridgewater Treatises had looked an unattractive proposition to prominent publishers, but in the event they were a great success for William Pickering; though Kirby's, it has to be said, was not one of the best-sellers. They were works of popularisation, science made palatable (and indeed momentous) by natural theology, and like Paley the authors were aiming at conviction, rather than logical proof Aimed at a different and it seemed less numerous class of readers than Lardner's, the volumes were large and handsomely-printed octavos, modestly bound in cloth cases with paper labels. The aim was to broaden the education of the educated; but in the event their readers must have overlapped with those of the Cabinet Cyclopedia, and the edition I have used is much more like Lardner's in appearance, and was published by Henry Bohn.

Kirby shows great respect for both Aristotle and Bacon, and duly mounts an attack on J. B. Lamarck (where he explicitly follows Charles Lyell) and P. S. Laplace for their evolutionary speculations. He refers to his 'venerated friend' Jones; and remarks of natural philosophy and the Scriptures:

> The Bible was not intended to make us philosophers, but to make us wise unto salvation. But it does not follow, because we seek for religious truth principally in the Bible, that we can derive none from the study of natural objects; nor, on the contrary, because we are not to go to the Bible for a system of philosophy, that no philosophical truths are contained in it.[26]

Elsewhere he remarks 'that in order rightly to understand the voice of God in nature, we ought to enter her temple with the Bible in our hands'. Passages in the Bible concerned for example with Cherubim are referring to the forces and powers of the Newtonian world.[27] Animal metamorphoses are, as in ancient tradition, compared to death and resurrection; and Kirby explains in fine polysyllabic style how hair, which in Scripture (we are told) stands for power and probably conducts subtle fluids (heat, electricity) in and out of animals:

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24 J. R. Topham, 'Beyond the "Common Context": the Production and Reading of the Bridgewater Treatises', *Isis*, 89 (1998), pp. 233-62; and see also D. A Knight, 'Genesis and Geology: a Very English Compromise', *Nuncius*, 15 (2000), pp. 639-54.

25 A Fisch and S. Schaffer (ed.), *William Whewell: a Composite Portrait* (Oxford: OUP., 199 1).

26 W. Kirby, *On the Power, Wisdom, and Goodness of God as Manifested in the Creation of Animals, and their History, Habits and Instincts,* new ed. (London: Bohn, 1853), vol. 1, pp. 18, 1, 347. The first edition of this and other Bridgewater Treatises is available (with numerous other 19th-century works) in microfiche from Chadwyck Healey (London, 2000), in the collection titled *Creation and Evolution.*

27 W. Kirby, *On the Power Wisdom and Goodness of God*, vol. 2, pp. 179, 21, 112, 384f.

> and thus the various piligerous, plumigerous, pennigerous, and squamigerous animals, may offer points and paths, not only to the air, but to more subtle fluids, either coming or going, whose influences introduced into the system, may add a momentum to all the animal forces, or which, having executed their commission become neutralized, may thus pass off into the atmosphere.

Since God did nothing in vain, we may be assured that the 'system of representation was established with a particular view'. All things in the world are significant, and our great Instructor's creatures are placed before us as signs or symbols representing other things, as well playing their part in the general drama. Since the Fall, learning by Revelation rather than through symbols and emblems has become more important: but spiritual truths are 'reflected as by a mirror, and shown as it were enigmatically', making the study of nature of the first importance. Especially we find examples of benevolent and beneficent, and of malevolent and mischievous, animals that represent the two classes of spirits to be found in the invisible world. Animals are not only directly useful for us, but also emblematic: we are in the realm of Aesop's fables, and of the bestiaries, and yet informed by up-to-date science. Many readers of Kirby must have been puzzled by the mix of the old and the new, but in a series directed particularly at clergy there would be much in the book that could be brought into sermons: this was not just information about surprising facts of nature. Kirby especially refused to do what was expected of Bridgewater authors, to separate the arguments for God's existence, wisdom and benevolence derived from nature from the evidence of revelation. Nobody reading his book could have supposed that zoology could lead to some natural religion: it only fitted into a big picture when associated with the Bible. The Book of Nature and the Bible illuminated each other, back and forth, and should not be separated. High-church science may be a surprising category, but we do find it in these educational treatises; and it is rather different from Rational Dissent as in Priestley and his disciples, and also from Paley's rhetoric of evidences.