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Geology and Genesis Unearthed

Michael B Roberts

The challenge of geology to Genesis is often perceived to be one of the issues of the 'Victorian Crisis of Faith'. Geologists had, since Charles Lyell published his *Principles of Geology* in 1831, been demonstrating that the earth was somewhat older than Archbishop Ussher's 6,000 years. Thus Richard Dawkins wrote: 'in 1862 the eminent physicist Lord Kelvin greatly worried Darwin by "proving" that the sun and therefore the earth, could not possibly be more than 24 million years. Although this estimate was considerably better than the 4004 BC date for the creation then favoured by churchmen...'¹ The historian Josef Altholz argued in 1976: 'The great majority of religious spokesmen condemned the doctrine of evolution, without regard to its scientific merits, on the ground of its repugnance to the text of the Bible and its tendency to degrade man to the level of beasts... Both sides (ie clergy and scientists) seemed to identify the substance of Christianity with the text of Genesis.'² Both assume that most clergy in mid-century were biblical literalists.

Neither Dawkins nor Altholz identified any of these literalists. Most would assume that Samuel Wilberforce would have been a leading literalist, as someone who damned doubters and attacked Huxley at the British Association in Oxford. However Wilberforce was no literalist, and had been on the committees of the Geological and Linnaean Societies, and had attended Buckland's lectures in geology at Oxford in the 1820s.³ In fact, very few churchmen in the 1860s were biblical literalists.

Goodwin's essay on the 'Mosaic Cosmogony' in *Essays and Reviews* is often cited as an attack on biblical literalism. Actually Goodwin criticized how Christian writers interpreted Genesis in the light of geology, choosing Buckland and Miller as typical, regarding their harmonizing of geology and Genesis as futile. More orthodox Christians, from the Archbishop of

1 R Dawkins in D McFarland ed *The Oxford Companion of Animal Behaviour* (Oxford: OUP 1981) p 155

2 J L Altholz 'The Warfare of Conscience with Theology' in G Parsons ed *Religion in Victorian Britain Vol iv* (Manchester: Manchester University Press 1988) p 162

3 Attendance Register of Buckland's Lectures 1820-4; Buckland Papers, Oxford University Museum. A Desmond *Huxley* (London: Michael Joseph 1994) *passim* under S Wilberforce

Canterbury downwards, responded angrily to *Essays and Reviews*.⁴ Samuel Wilberforce quickly brought out *Answers to Essays and Reviews*, including an essay by George Rorison on the poetic nature of Genesis, and a long appendix by John Phillips, Professor of Geology at Oxford.⁵ Of the many other 'answers', none were biblical literalist except the Plymouth Brother B W Newton.⁶ The pattern is clear that the vast majority of churchmen in the 1860s were not literalists and accepted the geological time-scale, and Anglican counter-examples elude me. Thus many interpretations of the Victorian 'conflict' of science and religion are flawed, especially over the alleged dominance of biblical literalism in relation to geology up to the 1860s.

My opening gambit on Lyell is deliberately incorrect. He is often portrayed as the geologist who almost single-handedly introduced concepts of geological time in 1830 and was opposed by the church.⁷ This is simply untrue as geologists had accepted the vast age of the earth since the 1790s, and before that many churchmen did not hold to creation in 4004 BC. As John Wyatt expressed it recently, 'Lyell did not "discover" the formidable age of the earth!'⁸ Wyatt's exclamation mark says it all, and implicitly criticizes such writers as Altholz, Vidler and Parsons.⁹ Lyell took over the Geological Column and time-scale from the (Christian) Catastrophists Sedgwick, Buckland, Conybeare and Smith. A minority of churchmen did oppose geology from 1825 to 1850, the most well-known being Dean Cockburn of York. It makes *more enjoyable* history to heighten the absurd, whether through Gosse's navel-gazing ideas in *Omphalos*, Mellor Brown's assertion of God planting fossils to mislead, or the cleric who thought God created mammoth carcasses under the arctic ice. For sheer entertainment on the folly of minority Christian writing on geology, the account by Hugh Miller, a devout conservative, Scottish Free Church, Calvinist Evangelical in *The Testimony of the Rocks*¹⁰ is unbeatable.

However, the popular view that Christians before Darwin were biblical literalists is reinforced by books and television. In his 1996 television series on genetics, *In the Blood*, Steve Jones took the viewers to Goat's Hole near Paviland Cave on the Gower in South Wales, where Buckland studied human remains in 1823, concluding that they were buried in Roman times.

4 J L Altholz *The Mind of Victorian Orthodoxy* pp 28-40 in G Parsons *Religion* vol IV

5 S Wilberforce ed *Answers to 'Essays and Reviews'* (London 1861)

6 B W Newton *Remarks on 'Mosaic Cosmogony' and Genesis II.5* (London 1882)

7 Articles on 'Darwin' *The Oxford Companion to English Literature* (Oxford: OUP 1995) and *The Oxford Companion to the Mind* (Oxford: OUP 1987)

8 J Wyatt *Wordsworth and the Geologists* (Cambridge: CUP 1995) p 156

9 Altholz 'The Welfare of Conscience' pp 153, 158; A R Vidler *The Church in an Age of Revolution* (Harmondsworth: Penguin 1961) p 114; G Parsons ed *Religion* vol II (Manchester: Manchester University Press 1988) p 192

10 H Miller *The Testimony of the Rocks* (Edinburgh 1858) especially pp 386ff

Rupke argued this was Buckland's caution,¹¹ but on television Steve Jones stated this was because Buckland, being a clergyman, believed the earth to be created in 4004 BC. Buckland discussed 'the Red Lady of Paviland' in *Reliquiae Diluvianae* in 1823, and in this and earlier works had stressed a vast antiquity of the earth. Jones simply had not done his homework. This false perception distorts understandings of the 'Victorian Crisis of Faith'.

The reasons for this distortion lie not in the *early* nineteenth century but in its closing decades. In 1896 Andrew D White, the President of Cornell University, published the final edition of *The Warfare of Science with Theology*¹² which has influenced the perception of the relationship of science and religion for a century, giving credence to what Professor Leslie Francis describes as 'the Perception of Christianity as Creationist'. Its influence can be seen in Josef Altholz's essay 'The Warfare of Conscience with Theology', which refers to White's book as 'the traditional approach to the subject',¹³ despite his protestations of proposing 'an alternative approach'. As Owen Chadwick expressed it so memorably:

Science versus religion – the antithesis conjures two hypostatized entities of the later nineteenth century: Huxley St George slaying Samuel smoothest of dragons; a mysterious undefined ghost called Science against a mysterious indefinable ghost called Religion; until by 1900 schoolboys decided not to have faith because Science, whatever that was, disproved Religion, whatever that was.¹⁴

White's arguments became the received wisdom of the twentieth century. Thus G D Yarnold, a conservative physicist-priest wrote in 1958: 'It is well known that Christian theologians at one time were somewhat reluctant to accept even the most certain conclusions of natural science into their thinking. However following a period of acute controversy...'

More recently, Professor Ward of Oxford wrote: 'they [theologians of the 1860s] thought it [The Origin of Species] conflicted with the account of creation in the Book of Genesis'.¹⁵

However, White is frequently inaccurate, as Russell stresses in *Cross-currents* as to the alleged Christian opposition to chloroform as an anaesthetic.¹⁶ Another example is his treatment of Wilberforce over

11 N A Rupke *The Great Chain of History* (Oxford: OUP 1983) p 92

12 A D White *The Warfare of Science with Theology* (London: Arco Publishers Ltd 1955)

13 Altholz 'The Welfare of Conscience' p 151

14 O Chadwick *The Secularisation of the European Mind* (Cambridge: CUP 1975/1990) p 161

15 G D Yarnold *The Spiritual Crisis of the Scientific Age* (London: George Allen & Unwin 1958) p 46; K Ward *God, Chance & Necessity* (Oxford: One World 1996) p 63

16 C Russell *Cross-currents* (Leicester: IVP 1985) p 197

evolution. To reinforce his argument, White gave seven quotes from Wilberforce's review of Darwin, of which three are untraceable, three are misquotations and the seventh is *almost* verbatim!¹⁷ Writing on the Victorian church, Alec Vidler quotes the same misquotations!¹⁸ Andrew White is no better on 'Genesis and Geology' where he posits a conflict between the 'orthodox' Christian view in which 'especially precious were the six days... to save these, the struggle became more and more desperate'.¹⁹ To back this up White cites quotations from J Mellor Brown and Henry Cole, two virulent anti-geologists, with a reference to Lyell's *Principles of Geology*. As Cole and Brown were writing in the late 1830s this was not in the first edition of 1831 and is absent from the ninth (1853) and later editions, thus the quotations most probably do not exist. White regarded those whom I, following Hugh Miller, call the anti-geologists as the orthodox wing of the church, of which more later. If White was correct to define 'orthodox' as belief in creation in six days, then none of the following were orthodox; S Wilberforce, C G Gorham, E B Pusey, J W Burgon, T R Birks, G Denison, or even George Eliot's favourite, John Cumming – citing a few whose orthodoxy is beyond question. However a hatchet job on White is pointless. As J H Brooke wrote of White and Draper: 'On closer inspection, however, they turn out to be deeply flawed. They share a defect in common with all historical reconstruction that is only concerned with extreme positions.'²⁰ Though White's work is discredited, it still exerts influence. The reasons for its adoption as a 'standard work' a century ago need to be explored, but this is beyond the scope of this article. Its popularity may be considered by reference to two near contemporaries, Thomas Huxley and Edmund Gosse.

Huxley is remembered for his triumph over Wilberforce at the British Association in 1860, which is presented in a near mythical form. The Huxley-Wilberforce episode has been reassessed frequently and most accessible is Gould's essay 'Knight takes Bishop',²¹ which shows that the received version is based on reminiscences thirty years on, and is unsupported by contemporary reports and letters. Colin Russell locates the social origins of the conflict metaphor with Thomas Huxley and the X-Club.²² Desmond, in his recent biography *Huxley* demonstrates how 'Huxley made straw men of the "Creationists"', by asking: 'Who... imagined elephants flashing into being from their component atoms?' As

17 White *The Warfare of Science* vol 1 p 70

18 Vidler *The Church in an Age of Revolution* p 117

19 White *The Warfare of Science* vol 1 p 223

20 J H Brooke *Science and Religion, some historical perspectives* (Cambridge: CUP 1991) p 35

21 S J Gould *Bully for Brontosaurus* (Harmondsworth: Penguin 1992) p 385

22 C Russell 'The Conflict Metaphor and its Social Origins', *Science and Christian Belief* 1 (1989) pp 3-27

Desmond said: 'His atomic elephant was a clever caricature. Yet many who were branded "Creationists" never thought in those terms.' This would include Sedgwick and Wilberforce. Huxley had distilled his professional dissenting strategy against the privileged Anglican Church into a Manichean Evolutionist versus Creationist slogan, us-versus-them. Having been so perceptive here, he later refers to Wilberforce as needing to be coaxed 'beyond the Six Days to a more informed opposition', overlooking the fact that Wilberforce had long accepted geological ages.²³ As Huxley and colleagues dominated the scientific scene at the end of last century it was their version of events which carried the day and has influenced the understanding of the relation of science and religion ever since.

Six years after Queen Victoria's death, Edmund Gosse published *Father and Son*, which has almost continuously been in print. Apart from being 'the exemplar of a genre' where children revenge themselves on parents in later life,²⁴ it also paints a graphic picture of conflict between Phillip Gosse's biblical literalism and the science of the day. 'Father's' *Omphalos* cut the Gordian Knot of Genesis and geology, not by clever exegesis, but through claiming that creation occurred a few thousand years ago with 'the structural appearance of a planet on which life had long existed'. It was rejected by Christian and agnostic alike, but Edmund Gosse gives the impression that 'the reactionaries' were far more numerous, wrongly including Richard Owen who resisted 'the theory of the mutability of species'.²⁵ No better refutation for that can be found than in the Historical Introduction to *Origin of Species*, where Darwin corrects his error in stating that Owen did not accept mutability in the first edition.²⁶ Although Edmund Gosse gave an inaccurate picture of science and religion, the sheer popularity of his book has helped to form the perception of generations of readers, and gives the impression that *Omphalos* with its prochronism, typified the beliefs of most Christians, whereas its acceptance probably did not leave the confines of the Plymouth Brethren.

These three have been pervasive in moulding how the relationship of science and religion has been *perceived*, resulting in a conviction that there was major conflict. For the years after 1859, it is assumed that most Christians opposed Darwin from a position of scientific ignorance and that in the half-century before, Christians believed in a six day creation and that geologists were infidels. Examples of literalist opposition can be found, but historical generalities cannot be derived from a few examples. There will always be a Gosse, a Mellor Brown or an F O Morris. Thus it is

23 A Desmond *Huxley* pp 256, 281

24 J Wintle *Furious Interiors* (London: Harper Collins 1996) p 199

25 E Gosse *Father and Son* (London: Penguin 1949) pp 84-8

26 C Darwin *The Origin of Species* (Harmondsworth: Penguin 1968) p 59

easy to ascribe to Lyell's *Principles of Geology* a significance it never had at the time. Lyell was the leading second or even third generation geologist, but he did not introduce the concept of vast geological time.

The historical task undertaken here has been to survey a wide range of literature and to identify patterns. The literature includes theological works of all persuasions, scientific works, general works, theological, religious and scientific journals and manuscript material. Particularly valuable has been surveying long runs of volumes of various journals, as these often give less-considered and more popular opinions than serious books. At all times theological and religious attitudes have been considered against the developing understanding of geology, which as a science dealing with the abyss of time began in the 1790s, the very decade when Evangelicalism became a dominant force in Britain.

The Coming of Geology

After 1790 there was a revolution in the understanding of the earth's history. Before that, many accepted the accuracy of Ussher's date of 4004 BC. However, many Christian writers before 1800, probably the majority, accepted that the earth was older, as God had first created Chaos and then much later ordered the earth in six days. Such writers include Bishop Watson of Llandaff, Pantycelyn, Traherne, many poets and other writers. Among British scientists in the Newtonian Era, Lhwyd, Hooke and Burnet and others questioned a Mosaic time-scale. Haydn's *Creation* is also based on this interpretation of Genesis with the creation of Chaos first, followed by 'a new created world'. Thus when geologists gave scientific evidence for an ancient earth in the 1790s, many churchmen had, for theological reasons, *already* accepted the universe to be older than Ussher's figure.²⁷ To those mentioned above need to be added Buffon, Maillet and Pluche from the continent in the eighteenth century. Buffon *was* in conflict with the Roman Catholic theologians of the Sorbonne. The challenges to a short chronology were various, geologically from both the 'deistical' uniformitarian geology of Hutton, and the apparently more biblical catastrophist geology of Smith, de Luc and later Cuvier. Initially, in the 1790s most thought the earth to be tens of thousands of years old, but Smith's successors vastly extended the age of the earth; astronomers calculated that some stars were two million light years away, and thus the universe must be millions of years old; and new historical research pointed to civilizations far older than 4004 BC.²⁸

Geology's first half-century may be split into two, the first from 1790-

27 This is a brief summary of an article I am working on.

28 C C Albritton *The Abyss of Time* (San Francisco: Freeman 1980) chaps 9-11

1820 saw the infancy of geology, marked by little opposition to geology, and the second 1820-50 marked the adolescence of geology and the heyday of the anti-geologists' opposition. The development is seen clearly in various geological columns, which are devices of tabulating relative age. Before 1790 there was virtually no concept for geological age as may be exemplified by the writings of Erasmus Darwin, who reckoned that coal could lie above chalk. Up to about 1815 there was a lack of consensus among geologists, but from about 1820, if not earlier, there was a broad consensus on the geological column, and the vast antiquity of the earth. By 1850 the Geological Column from the Cambrian to the Pleistocene was almost as today's.

The Infancy of Geology 1790-1820

Geology as a science developed in the decades after 1790, with different approaches in Scotland, England, Germany, and France. The key was to elucidate the history of the earth by the stratigraphical principles developed almost simultaneously by William Smith near Bath, and Cuvier and Brogniart in the Paris Basin in about 1795. By using fossils, geologists were able to put strata in the order of deposition, and thus of age. The early geologists did not accept evolution, and explained the successive changes in fossil fauna by extinction followed by new creations, and thus are rightly termed Creationists. (Part of the confusion over the nineteenth century is the ambiguous use of the term 'Creationist', including both those who were 'Young Earthers' and held to an Ussher date of 4004 BC and 'Old Earthers' like Sedgwick or Miller who reckoned the earth to be millions of years old.) Before 1790 there was no historical geology, and though individuals were competent observers, geology did not progress much beyond the 'Theories of the Earth' of the seventeenth century.

In England, geology came with the Industrial Revolution. William Smith was a canal engineer working near Bath, and in 1795 spotted that the same sequence of fossils was repeated in two valleys, thus working out the order of the strata. He then applied his methods to the whole neighbourhood of Bath. Two local clergy, Benjamin Richardson and Joseph Townsend, encouraged him to publicize his methods. The geological aspects are fairly well-known, at least to geologists. The theological aspects undermine a conflict scenario of geology and Genesis and have received little attention. William Smith was no empiricist whose science was not coloured by his beliefs as he mixed up his religion and his science. Particularly strong was Smith's belief about the Deluge, which loomed large in his explanations as the last catastrophe to have major geological effect. During the '90s many, including de Luc, postulated more than one Flood. However by 1801, Smith concluded that the bulk of strata were laid down before the Deluge:

But repeated and accurate observations since have satisfied me that the Deluge we read of had no more to do with the formation of those fossils than the formation of the immense strata of solid rocks in which they are imbedded... For I verily believe that those waters did not penetrate to such a depth or disturb the strata so much as has been imagined.²⁹

At the same time Smith also concluded a vastly extended age of the earth.

Little is known of Benjamin Richardson or his theology, but more about Townsend. After Cambridge and medical studies at Edinburgh he took orders in 1765 and settled at Pewsey Rectory. He was an early Evangelical, becoming one of the Countess of Huntingdon's preachers along with his brother-in-law Thomas Haweis, from 1765 until 1779. However, despite helping to propagate Smith's ideas, writing his *magnum opus* in 1810, Townsend still inclined to a young earth, introducing a historical irony.³⁰ Thus in England much of the early spread of geology was due to ecclesiastics.

Geology was different in Scotland, as the father of Scottish geology, James Hutton, was a leader of the 'Scottish Enlightenment'. He was the first to recognize unconformities at Siccar Point, and coined the expression 'the present is the key to the past' for his Uniformitarianism. Publishing in the reactionary 1790s, he was opposed by Kirwan who saw his work as rank Deism. Later the Reverend John Playfair of Edinburgh reworked Hutton as *Illustrations of the Huttonian Theory of the Earth* in 1802, thus making Hutton acceptable to even the most evangelical of Scots geologists, whether John Fleming or Hugh Miller.

The first two decades of the nineteenth century saw a great proliferation of geological knowledge, with the formation of the Geological Society of London in 1809. In 1815 Smith's geological map of England and Wales was published. 1818 witnessed the election of Adam Sedgwick as Professor of Geology at Cambridge – defeating the Evangelical, Charles Gorham of Queens, who in 1847 became famous for the Gorham case over baptism. In 1818 William Buckland gave his inaugural lecture at Oxford, published as *Vindiciae Geologicae*, and over the next ten years half the mid-century bench of bishops had attended his lectures.

In three decades geology was transformed from speculation about the

29 L R Cox 'New Light on William Smith and his work', *Proc Yorks Geol Soc* XXV 1942 p 89

30 A G Davis 'The triumvirate; a chapter in the heroic age of geology', *Proc Croydon Nat Hist Scient Soc* II 1943, pp 123-46. J Townsend *The Character of Moses established for veracity as an Historian* (Bath 1813).

Flood to a historical reconstruction of the world. In 1790 it was *just* possible for an 'up-to-date' geologist to accept 4004 BC as the date of creation, but by 1810 all geologists accepted a vast age. Significant is James Parkinson's (of the disease) three volume *Organic Remains of a Former World* (1804-11). Volume one was published in 1804, expounding a young earth, but when volume two was published in 1810, the author had become an old earther. From hindsight many ridicule the early geologists' preoccupation with the Flood and use that to demonstrate ecclesiastical interference.

Confining ourselves to England, over the next three decades several geological works were published, as well as many articles in various journals, and the *Transactions of the Geological Society* from 1807. In many of these volumes the Deluge looms large, and, at the risk of oversimplifying, as the years progressed, so did the number of deluges and the age of the earth. One of the early works was by the Swiss, de Luc, who moved to England, whose *Elementary Treatise of Geology* (1809) reflects *advanced* geological opinion. He considered that the six days of Genesis corresponded to six geological periods and that there was at least one other convulsion apart from the universal Deluge which occurred some 4000 years ago. De Luc was sure that geology substantiated Genesis, and that those who had published geological systems contrary to Genesis had been proved wrong. Nares used de Luc to support a conservative stance in his 1805 Bampton's, which were still sympathetic to geology, unlike his later works.³¹

By the 1810s mainstream geologists had extended the time-scale though they often emphasized deluges. Earlier geologists like de Luc and his successors up to about 1830 attempted to make a direct correlation between the Deluge and the uppermost strata, frequently called *diluvium*. To many, this attempt is an example of bad science and doomed to failure, and is an example of the church's tyranny over science. Gillispie in *Genesis and Geology* is negative to Catastrophism, but there is another perspective, put forward forcibly by Stephen Gould. However these geologists were neither foolish nor browbeaten by the church. Taking into account the *total* culture of the late eighteenth century, it was almost inevitable that many geologists, particularly religious ones, would begin with one Flood, multiply it and finally let them drain away, later correcting themselves, by 'good geology', in a manner similar to that of chemists over the Phlogiston Theory. Undoubtedly that is because the Bible gives no clue to chemical phenomena, but geology is historical and early Genesis is couched in historical form.

31 J A de Luc *An Elementary Treatise on Geology* (London 1809) p 8

The church's response to geology before 1820 did not exhibit the fury of the anti-geologists of 1820-50. Many theological writers were seemingly oblivious, for example Thomas Scott, who published his well-known Bible commentary in 1792. However its tacit literalism may well have stored up problems for the future, especially for the generations who used it in its many editions. Bishop Samuel Horsley of St Asaph (1734-1807) held to a semi-literalistic stance, holding that there were neither sun nor stars until day four, but he argued that God created Chaos first and *later* re-ordered creation in the six days. As Horsley expressed it: 'The interval between the production of the matter of the chaos, and the formation of light [ie the first day] is undescribed and unknown.'³²

Apart from Richard Kirwan, one almost searches in vain for opposition meriting the term 'warfare'. Kirwan (1733-1812) was a respected chemist and natural philosopher who objected forcibly to Hutton's geology from 1794, both in his *Geological Essays* and contributions to the *Philosophical Magazine*. His approach was largely scientific but concluded with the Mosaic history. One example from the *Philosophical Magazine* of 1802 will suffice, which is a reply to Playfair who objected to Kirwan's criticisms. Most of Kirwan's responses are scientific, but he objects to Playfair's refusal to use Genesis as a guide for geology, stressing the historical but not scientific nature of Genesis.³³ It is indicative of the transitional state of geology at that time that such ideas were published in a scientific journal. History is not always kind to Kirwan, but his geological ideas are akin to those of Townsend, who was both young earther and mouthpiece for William Smith. Neither can be considered opponents of geology, but, at worst, a bit slow in accepting the abyss of time.

Some writers dismissed geology as in 1809 when William Hales published *A New Analysis of Chronology*, a verbose work continuing the chronological studies of Ussher and Newton. His date for creation differed from Ussher – probably in the spring, about the vernal equinox in 5411 BC – and acknowledged a variety of dates from 4000-6000 BC (Vol II p 2). In commenting on the Deluge, he complained: 'How unscripturally then and how unphilosophically do our modern geologists reason', citing in particular de Luc. A similar approach to chronology was adopted by some, including Cunninghame and Frederick Nolan, over the next few decades, but by mid-century it was rejected by all.

Religious journals are a good guide on how churchmen thought about geology, as these often reflect immediate, rather than measured, reactions. Three journals cover a wide English theological spectrum.

32 S Horsley *Biblical Criticism* Heneage Horsley ed (London 1820) vol 1, p 2

33 B Hilton *The Age of Atonement* (Oxford: Clarendon Press 1988)

The Christian Observer was published from 1802 and was the most popular Anglican evangelical magazine until the *Record* began in 1828. Despite commenting on every subject from bull-baiting to baptism, nothing geological entered its pages until volume 14, in 1815. Over the next few volumes there were book reviews of Chalmers' *Evidence and Authority of the Christian Revelation* (1815), Cuvier, Brown and Sumner, and Gisbourne. Apart from Gisbourne, all these volumes were in favour of the modern geology. On Chalmers the reviewer wrote: 'The plain fact is, that neither has the Saviour declared the age of the world, nor has Moses himself...' Brown and Sumner were both acclaimed, but no mention was made of their acceptance of geology. From these reviews it is clear that Evangelicals were not unequivocal either way, but the tone was eirenic and, if anything, they were cautiously pro-geology. This was probably due to the influence of Chalmers in Scotland and Sumner in England.

The more strident and dissenting *Evangelical Magazine* was less happy. Reviewing Parkinson in 1805, the lack of criticism was balanced by a wariness of geology. Over the years a T Rankin wrote on the Deluge, and in 1816 presented the Guadeloupe Man as evidence of the Deluge. Significantly the only work touching on geology reviewed was in 1820, when the Methodist, Joseph Sutcliffe's *Short Introduction to the Study of Geology* was given favourable treatment, as befitted a vindication of the Mosaic account which maintained that all strata were deposited in the Deluge. The reviewer did not approve of any theory which did not show that the creation of the world was contemporary with that of man.³⁴

The High Church Anglican *British Critic* included several reviews of geological works from 1810 to 1820. The reviewers were appreciative of de Luc in 1810 and the *Transactions of the Geological Society* in 1811. On reviewing the later volumes of Parkinson, who held to a 'long day' in Genesis 1 with de Luc, it comments: 'We do not pretend to have made up our minds on the subject, but wait...' (vol XXXIX, p 580, June 1812). They were not happy with Jameson's *System of Mineralogy* (1808, reviewed July 1810, vol XXXVI), but did not object to the long periods of time put forward by Cuvier (1814 New Series) reviewing Cuvier's *Essay on the Theory of the Earth* with notes by Jameson, Edinburgh 1813. In 1815 they were appreciative of Benjamin Kidd's *Geological Essay* which, though not young earther, 'furnished several collateral and important proofs that the Mosaic history is a true... record of man and of the globe...' (New Series IV: 1815 pp 144ff) p 162. The following year they recommended both Sumner's *Treatise* and Chalmers' *Discourses* (VI pp 332ff and VII p 586) and in 1819 (XII) were favourable to Greenough's *A*

34 E Nares *A View of the Evidences of Christianity at the Close of the Pretended Age of Reason* (Oxford 1805); *Man, as known to us theologically and geologically* (London 1834)

critical examination of the first principles of geology, a standard orthodox geology which eschewed speculation. The *British Critic* probably reflects orthodox High Church Anglican opinion, which was sympathetic to geology and slowly shifted from the semi-literalism of the last century without any semblance of warfare.

These examples show that there was no great acrimony or conflict over the earth's antiquity. Perhaps one reason was that there was still a fairly limited view of the age of the earth. For example de Luc, while eschewing 4004 BC, hardly went as far as Buckland's 'millions of millions', and thus Edward Nares could call on de Luc to support his nearly literal approach in his 1805 Bampton Lectures. However, thirty years later, Nares had joined the 'anti-geologists'. The example of Nares alone should make one cautious in judgment.³⁵ It was not a black and white issue, and the dividing line between anti- and pro-geologist could be very fine indeed.

The ambivalent attitude to a vast age of the earth is reflected weakly in secular journals, as in Mr Tulloch's *Philosophical Magazine*, which was published for many years from 1798. During the next twenty years contributors included Kirwan, Cuvier, Farey, Bakewell and George Young, and Brogniart and Cuvier's seminal study of the Paris Basin in 1810. Though this was a scientific journal, theological issues in relation to the age of the earth and the Deluge were discussed. Before 1805 some contributors, notably Kirwan, tended to young earthism but there was no heated controversy and none of a religious nature. The large number of geological papers after that provide rich material on the development of geology, but little on religious concerns – except a series of discussions *On the Cosmogony of Moses* in 1816 between Dr Prichard and others, especially an 'F E' who argued for a more literal approach. Prichard referred readers to G S Faber's *Origin of Pagan Idolatry* discussed below. One correspondent, H S Boyd, wrote from Margate in 1817, totally rejecting Jameson's reconciliation of Moses and Cuvier with his vast ages. To Boyd, no animals lived and died before Adam, as death came with Adam's sin, and thus all geologists were wrong and the earth was young.³⁶

Two of the most significant theological writers in the 1810s were Thomas Chalmers and John B Sumner. Both are normally remembered, and criticized, for their political economy. What is of interest here is their Evangelicalism and understanding of geology. Chalmers began his career as a moderate clergyman in the Church of Scotland, opposing Evangelicalism. In about 1810 he became an Evangelical and soon was the effective leader of the Evangelical Party of the Kirk. In 1843 he led out a

35 E Nares *A View of the Evidences of Christianity*

36 H S Boyd 'On Cosmogony' *Philosophical Magazine* vol 48 (1817) pp 375-8

third of the clergy and many laity in the Disruption, and set up the Evangelical Free Church of Scotland. The details of that do not concern us here, beyond noting Chalmers' strong Evangelicalism.³⁷ Sumner studied at Kings' Cambridge, where he was influenced by Charles Simeon. On leaving Cambridge he taught at Eton, being ordained in 1803, leaving there to become vicar of Mapledurham in 1818, Bishop of Chester in 1828 and Archbishop of Canterbury in 1848.³⁸

Chalmers is remembered for the Gap Theory on Genesis 1 where a 'gap' is postulated between the initial creation and the first day, during which all the geological strata were laid down.³⁹ The work of the six days is in fact the re-creating of the world from the original chaotic creation. This exegesis is unconvincing today, but it was the dominant interpretation until the 1850s. Thomas Chalmers first presented this during lectures on chemistry given at the University of St Andrews during the winter of 1803-4. Hanna, in his biography, included a long reference on Chalmers' geological aside:

By referring the origin of the globe to a higher antiquity than is assigned to it by the writings of Moses, it has been said that geology undermines our faith in the inspiration of the Bible... This is a false alarm. *The writings of Moses do not fix the antiquity of the globe. If they fix anything at all, it is only the antiquity of the species.*

Hanna did not include any reference to the interpretation of Genesis 1, but did so when discussing his father-in-law on geology in 1814, quoting his review of Cuvier's *Essay on the Theory of the Earth in The Christian Instructor* for April 1814 (p 387). Here Chalmers was explicit: 'Should the phenomena compel us to assign a greater antiquity to the globe than to that work of days detailed in the book of Genesis, there is still one way of saving the credit of the literal history.'⁴⁰ Literal here does not have the same meaning as today.

A year previously, in 1813, Chalmers had published *Evidences of Christianity*, in which he put forward similar ideas in a chapter entitled 'Remarks on the scepticism of Geologists'. Here Chalmers was more circumspect than he was the following year, allowing at least in rhetorical form, that geologists might be wrong. However he made it clear that a high antiquity of the earth was no threat to Christianity.

37 W Hanna *Memoirs of the Life and Writings of Thomas Chalmers* (Edinburgh 1852) 4 vols
G Parsons *Religion in Victorian Britain* (Manchester 1989) Vol 1 pp 117-45

38 N Scotland *The Life and Work of John Bird Sumner* (Leominster 1995)

39 H Blocher *In The Beginning* (Leicester 1984) p 41

40 Hanna *Thomas Chalmers* pp 81, 386

Though a reading of these extracts gives the impression that Chalmers was giving a novel exegesis, and adopting special pleading to incorporate geology, he was building on a long tradition as described above. Chalmers' proposal that geological findings should be accommodated into the 'Chaos' or 'Gap' fitted into contemporary, widely held modes of interpretation. The widely accepted Gap in Genesis 1:2 was providential. The vast geological ages were fitted into that long undefined interval, and theology seemed to support geology with its succession of catastrophes. Further, the animals being discovered – ammonites up to two feet across, saurians, and megatheria – were no longer to be found on earth, they went extinct, and were replaced by new created animals which sprung up when 'the new-created earth sprung up' at the beginning of the final creative week which occurred some six thousand years ago.⁴¹ Thus Chalmers could argue in his 1804 lectures on chemistry at St Andrews: 'The writings of Moses do not fix the antiquity of the globe. If they fix anything at all, it is only the antiquity of the species.'

Sumner published *A Treatise on the Records of the Creation and the Moral Attributes of the Creator* in 1816, which was well-received. The main theme was political economy and it deals with geology in an appendix to volume I. Sumner adopted a similar exegesis to Chalmers, thus seeing no conflict of Genesis and geology. Sumner later became theological adviser to Buckland and was quoted at length in *Vindiciae Geologicae*.

A good example of a slow shifting away from a non-dogmatic literalism can be seen in the writings of G S Faber (1773-1854). Uncle of F W Faber, Faber was a prolific evangelical writer during the first fifty years of the nineteenth century, writing many volumes on prophecy, against the Oxford Movement and on more general theological themes. The DNB lists his twenty-seven most important works! Among these are many passing references to geology and Genesis. His 1801 Bampton Lectures (*Horae Mosaicae*) make one tantalizing reference to geology: 'while the bowels of the earth are ransacked to convince the literary world of the erroneousness of the Mosaical Chronology',⁴² which seems to imply hostility. However, by 1816 Faber demonstrated both his awareness and acceptance of geology in his massive three volume work, *The Origin of Pagan Idolatry*. Tucked away in volume two are a few pages referring to geology, indicating his familiarity with de Luc's geology. However he did not accept that the Deluge was of catastrophic effect, claiming de Luc to be mistaken.⁴³ He continued his interest in geology in *A Treatise of the Three Dispensations* of 1823 and *The Difficulties of Infidelity* of 1824, in which he reverses his

41 F J Haydn *The Creation* chorus of aria 'Now vanish before the holy beams'.

42 G S Faber *Horae Mosaicae* (London 1802) p viii

43 G S Faber *The Origin of Pagan Idolatry* (London 1816) pp 283-8

previous opinion of 1816 and cites Cuvier, Dolomieu and de Luc in support of a devastating Deluge, thus indicating the influence of Buckland on his ideas.⁴⁴ According to Rupke, Buckland had three theological advisers and supporters, Faber, J B Sumner and Shute Barrington, who must take the credit for having been the most conservative Bishop of Durham and spent fifty-seven years as a bishop, dying in 1826. In the 1830s and 1840s Faber wrote extensively against the Tractarians.

These two ‘Harmonies’ of geology and Genesis were the most widely accepted interpretations for the next thirty years, the Gap Theory being the most popular, being adopted by Buckland, Sedgwick, Conybeare and later by Pratt and Birks in England. In Scotland it was adopted by most, including Fleming, Hugh Miller (until 1847), Candlish and Duns, who was almost the only Scot to oppose Darwin.

The Adolescence of Geology 1820-1850

In the years after Waterloo several significant geological events occurred. In 1815 Smith published his geological map of England and Wales, and Buckland and Sedgwick effectively brought geology to the universities of Oxford and Cambridge, making them leaders of the new science. The dominant school of thought in England was Diluvialism or Catastrophism, and Buckland gave classic expression to this, but was dealt a mortal blow by Lyell. In the 1830s Catastrophism waned, Lyell subdivided the Tertiary, Buckland imported the Ice Age, and geology was weaned from its scriptural roots. Within the geological world there was lively argument, friendly, as in the case of Lyell and his Catastrophist opponent Conybeare, and thoroughly acrimonious, though non-theological, between Murchison and Sedgwick.

These decades are those of the controversy of Catastrophism and Uniformitarianism, which is frequently exaggerated beyond all proportion. It was more an argument *between* geologists, and not between Christians and scientists. The hackneyed misunderstanding of this is amusingly exploded by S J Gould, with his series of *cardboard cutouts* who are shot up with unwavering accuracy.⁴⁵ Without this correction, no proper assessment can be made of the interplay of Christianity and geology. Whatever stance a geologist took over Catastrophism and Uniformitarianism, it made no difference to either the progress of unravelling the stratigraphic column or to attitudes of geological time in the 1820s and 30s. In his classic but severely flawed paper on the defects

44 G S Faber *A Treatise of the Three Dispensations* (London 1823) pp 111-65. Rupke *The Great Chain* p 14

45 S J Gould *Time's Arrow, Time's Cycle* (Harmondsworth 1988) pp 99-181

of parson-naturalists, Frank Turner claims but does not document ecclesiastical hindrance to science.⁴⁶ The ‘parson-geologists’ Sedgwick, Buckland and others, pushed back the frontiers of geology, so when in 1830 Lyell published his uniformitarian manifesto *The Principles of Geology* he was building on their work, the ‘Catastrophic’ Columns of Smith (1815) and Conybeare and Phillips in *Outlines of the Geology of England and Wales* (1822). It cannot be emphasized enough that Uniformitarians like Lyell were often good friends with Catastrophists such as Buckland and Conybeare. Like the Oriel dons of Copleston’s, geologists were ruthless in debate but often the best of friends and pugnacious comments must be seen in this light. ‘Recantation’ of the old Catastrophism did not affect either Buckland or Sedgwick in their stratigraphic elucidations, or inhibit their view of ‘millions on millions’ of ages. Buckland seemed to move from the Catastrophism of the Deluge to the Catastrophism of the Ice Age. Hence Henslow could easily recommend with reservations *The Principles of Geology* to Darwin as he set sail on the Beagle. Catastrophism had a strong appeal to biblically-minded geologists, as a series of Deluges were considered to have laid down the strata, the last one being the Noachian Deluge.

William Buckland can be considered a ‘bridge’ person between earlier geologists like de Luc, who make a direct correlation between the Deluge and geology, and the mid-century geology which ignores the Deluge. Buckland’s early works are full of the Deluge: *Vindiciae Geologicae* and *Reliquiae Diluvianae*⁴⁷ attempt to harmonize geology with the Deluge. Over time Buckland became less convinced of Diluvialism and finally recanted in his Bridgewater Treatise *Geology and Mineralogy Considered with Reference to Natural Theology* published in 1835, as had Sedgwick some years earlier in 1831. Some of his earlier wrestlings may be found in scarcely legible notes in the Deluge File at Oxford. These can be read in two ways; either a devout Christian adopting special pleading to keep his faith, or someone grappling with new ideas.⁴⁸

As Gould stresses, the polarized nature of the controversy is a myth which will not die. It is a gross misrepresentation to claim Lyell introduced concepts of high antiquity. As far as *method* is concerned, the arch-catastrophist Buckland and the arch-uniformitarian Lyell were very similar. Nothing can be more *Uniformitarian*, in the sense that ‘the present is the key to the past’ than Buckland keeping a hyena at Christ Church to

46 F J Turner ‘The Victorian Conflict between Science and Religion: a professional dimension’ in G Parsons ed, *Religion in Victorian Britain* vol IV *Interpretations* (Manchester 1988) p 176

47 W Buckland *Vindiciae Geologicae* (Oxford 1820) and *Reliquiae Diluvianae* (London 1823) and Rupke *passim*

48 W Buckland *Deluge File* Oxford University Museum

understand the fossil Kirkdale hyenas, by observing their eating habits – including pet guinea-pigs! Darwin's extreme Uniformitarianism delayed his accepting of Ice-Ages in the 1840s, as he considered them as Catastrophic. Visiting Snowdonia in 1842 he insisted that sea-level was once at 1000 feet, and was very reluctant to relinquish ideas of a yo-yoing sea-level at 1200 feet in Glen Roy until the 1860s, thus making 'a long, gigantic blunder' as surely as any cleric.⁴⁹

Geology and Genesis Leading to Darwin

During the 1820s many Anglicans and Scottish Presbyterians adopted the Gap Theory of Chalmers and Sumner, and thus found no conflict between Genesis and geology. However, this statement needs qualification, as the only people who can be studied are the educated who wrote either in books or magazines. With the exception of Edward Nares at Oxford and Simeon at Cambridge, this was the dominant outlook at both Oxford and Cambridge and the Scottish universities. At Edinburgh, alongside the radical evolutionists like Robert Grant, were the Reverend John Fleming, an Evangelical, who anticipated Lyell on Uniformitarianism in 1824, and the geologist Jameson, who gave theological glosses to Cuvier's geology. There was less diversity at Oxford and Cambridge as all dons were clergy, and most were strong 'old earthers', the geologists Buckland and Sedgwick, the two Conybeares, William Whewell, the Oriel Noetics led by Copleston, including Thomas Arnold, and John Henslow to name the most well-known. Whether these were basically Evangelical or nascent Broad-Churchmen would make a fascinating research project in itself. Susan Cannon argued that those who supported geology were a Broad Church network. Baden Powell and some of the Oriel Noetics were, but Sedgwick, Buckland, Conybeare and Whewell were Moderate Evangelicals, and Darwin's mentor Henslow was so orthodox that he could not contemplate rejecting any of the Thirty-Nine Articles. In 1860 it was Henslow who chaired the meeting when both Huxley and Wilberforce were present, and allowed Hooker, his son-in-law, to refute Wilberforce.⁵⁰

In England, Sedgwick and Buckland led the geological fraternity until in the 1830s when Lyell and others came to prominence, geology became a less churchy occupation, and they were side-tracked by ecclesiastical office; Buckland to be Dean of Westminster and Sedgwick to a canonry at

49 C Darwin 'Observations on the Parallel Roads of Glen Roy' 1839: 'Notes on the Effects produced by the ancient glaciers of Caernarvonshire' 1842, reprinted in P Barrett ed *The Collected Papers of Charles Darwin* (Chicago 1977); J Browne *Charles Darwin: voyaging* (London 1994)

50 W Cannon 'Scientists and broad churchmen: an early Victorian intellectual network', *Journal of British Studies* (1964) vol 4 pp 65-88

Ely. Their geological expertise is beyond question, even though Frank Turner attempted to dismiss Sedgwick as a clergy-amateur.⁵¹ A cursory awareness of the history of geology and their contributions would dispel that myth. Retracing the footsteps of Sedgwick and Buckland on their Welsh field trips, as I frequently do, increases one's respect for their prowess, both physical and intellectual.⁵² After 1831 their geological writing contained very little theology, though it is present in Buckland's Bridgewater Treatise, where the theological implications of predation and design are discussed at length. Buckland's paper on glaciation in North Wales is as non-theological as Darwin's paper the following year, but in some unpublished papers from the 1840s he wrote: 'Thus the flood that caused the Diluvium which in my Bridgewater Treatise... was probably due to the melting of the ice.'⁵³ These two clerical geologists, or parson-naturalists, needed expounding at length because of their influence within mainstream Christianity and in academic and popular science, and the tendency of White and his disciples to belittle their scientific competence. Most Mechanics institutes had copies of the Bridgewater Treatises and thus Buckland's geology was widely read, and they had great influence both in the universities and the British Association.

White, desperate to keep the war going, wrote: 'The defection of Buckland was especially felt by the orthodox party.'⁵⁴ Buckland has not been well-served by biographies but all studies, especially Rupke, show that he was a mainstream orthodox Anglican, though he had the odd fracas with anti-geologists. Though not a party man, Buckland was, if anything, a Moderate Evangelical and was patronized by Evangelicals. Concerning the orthodoxy of his Bridgewater Treatise, Buckland wrote to Sedgwick: I have not much to fear for my theology, having shewn my early sheets to the Bishops of Chester [Sumner] and Llandaff [Copleston], and to Professors Burton and Pusey, all of whom are perfectly content.'⁵⁵ This amused Lyell. After Nolan's Bampton Lectures in 1833 Buckland was aware of some Christian opposition to geology, which is brought out in Thomas Sopwith's cartoon of Buckland at Betwys y Coed in 1841. However Dean Gaisford's comment: 'Well Buckland is gone to Italy; so thank God, we shall have no more of his geology!' is totally misunderstood by White⁵⁶. Buckland must have been an awful neighbour with his menagerie of hyenas and other animals, not to mention his eccentricities and buffoonery! Rupke argues forcibly that Gaisford's opposition was not

51 F J Turner *The Victorian Conflict* p 183

52 A Sedgwick *Sedgwick's Journal* No XXI (1831) Sedgwick Museum Cambridge; W Buckland 'On the Glacia-diluvial Phaenomena in Snowdonia and the adjacent Parts of North Wales', *Proc Geol Soc iii* (1842) pp 579-84

53 W Buckland Glacial File, Oxford University Museum

54 White 'The Warfare of Science' p 232

55 Buckland to Sedgwick, 28 Oct 1835, quoted Rupke, p 205

56 White 'The Warfare of Science' p 232

theological but the cultured anti-scientific attitude of a classicist. Gaisford's anti-geological prejudices were shared by J H Newman and the Broad Churchman Benjamin Jowett who saw science as a menace to the 'higher conception of Knowledge and of the mind'.⁵⁷ In the 1850s Jowett opposed the setting up of science schools in Oxford, whereas Pusey supported them, having previously written a long exegetical footnote on Genesis in Buckland's *Bridgewater Treatise*. So much for the conventional opinion that the Broad Church 'Essayists' supported science and the 'orthodox' opposed science. As Rupke expounds the matter, Buckland's difficulties in Oxford were intellectual because the tradition of classical learning was inimicable to scientific methods, thus foreshadowing C P Snow's *The Two Cultures* by 130 years.

This general ecclesiastical acceptance of geology is reflected in the content of the main journals.

The *Quarterly Review* was a mainstream orthodox Anglican Tory journal of a high intellectual standard. *Quarterly Review* contributors were officially anonymous, but many have been identified, the most well-known being Wilberforce on Darwin in 1860. Early in the decade Copleston reviewed *Reliquiae Diluvianae*, possibly at the instigation of Buckland and discussed at length both theology and geology past and present. In his lecture Buckland had discussed four interpretations of Genesis, including literalism which was rejected, leaving the best two of a 'Long Day' following G S Faber and a Gap Theory following J B Sumner. Copleston claims that Buckland favoured a 'Long Day', but moved to the Gap Theory for his *Bridgewater Treatise*. (A study of both Faber's and Buckland's writings of this period shows that Buckland was influencing Faber in his geology, and Faber was influencing Buckland in his theology.) The important thing is that neither Buckland nor his reviewer felt any constraint to be literalist as Copleston wrote the 'principle of accommodation to our perceptions and modes of speaking must be admitted'. Copleston acknowledged that Buckland's references to religion were the most important part of the book. Though the *Quarterly Review* was an orthodox Anglican journal, some Anglicans objected to Copleston's review and Bugg in his *Scriptural Geology* wrote of the reviewer that 'this system of geology has greatly warped his mind... Sumner, Buckland and Faber evidently coincide with him'.

However, the editor of the *Quarterly Review* recruited Lyell to ensure that geology was well represented and thus Lyell reviewed the early volumes of *Transactions of the Geological Society* in 1826 and *Scrope's Geology of Central France* in 1827, which contained arguments against

57 Rupke *The Great Chain of History* p 271

Buckland's diluvial theory later developed in his *Principles of Geology*. Ironically the article on Scrope was extended at Buckland's suggestion to 'hit at the Penn school' of biblical literalism. In between these Lyell wrote on the *State of the Universities* lauding among other aspects the geological lectures of Buckland and Sedgwick. Lyell, a pupil of Buckland, was followed by another lay geologist Scrope, a pupil of Sedgwick, who favourably reviewed *Principles of Geology* in 1830 and 1835, though he described the differences between the English School and Lyell's new Huttonian geology which to Scrope went too far in denying any progression in earth history. However he regarded Lyell as an introduction to Buckland's natural theology in his forthcoming treatise (Vol Iiii 1835). When reviewing Buckland's Bridgewater Treatise, Scrope detailed Buckland's recantation of his earlier diluvial theories with approval but reckoned 'that Dr Buckland will be the means of introducing many a saurian... to... those who would hardly have heard of such beings but for his excellent book' (Vol Ivi 1836 p 62).

No journal better reflected Anglican and Tory principles than the *Quarterly Review*, and these geological reviews show how Anglican orthodoxy was accepting and welcoming of geological findings and adapted as they changed. An awareness of the significance of this journal and its attitude to geology should on its own be sufficient to demonstrate that White's alleged warfare of Genesis and geology is a myth.

The *British Critic* narrowed in its approach after it was taken over by the Tractarians in the 1830s. Before that it contained some notable geological articles. In 1828 Sumner gave a damning review of Ure's *New Geology* and in 1831 Whewell gave a critical, yet sympathetic review of the Uniformitarianism of Lyell's *Principles of Geology*. Whewell saw Uniformitarianism and Catastrophism as more similar than they are usually perceived: 'The course of things is *uniform* to an intelligence which can embrace the succession of several cycles, but it is *catastrophic* to the contemplation of a man whose survey can only grasp a part only of one cycle.' Shortly afterwards Lyell wrote to Whewell suggesting the terminology for the Tertiary to be; Asynchronous, Eosynchronous, Meiosynchronous and Pleiosynchronous. Fortunately these were not accepted, as Whewell suggested Eocene, Miocene and Pliocene, terms which Lyell adopted. Thus the terminology of the uniformitarian division of the Tertiary was suggested by a religious Catastrophist! The following year Whewell wrote a similar review on the *Principles of Geology* for the *Quarterly Review*.

The *Christian Observer* was far more ambivalent in its approach to geology, as the emphasis on the Bible by Evangelicals at times moves towards literalism. With the burgeoning of Evangelicals in the 1820s, the

decade was marked by moves to reform and counter-reaction, and the development of a more hard line Evangelicalism. Boyd Hilton sees this in the rise of the *Recordites* after the *Record* began publication in 1828. It can also be seen in the influence of the Haldane brothers who introduced biblical inerrancy into modern discussion in 1828. The pages of the *Christian Observer* give an insight into Anglican evangelical attitudes to geology as it is mentioned in most issues. Over several issues readers were treated to a long review of Faber's *Dispensations*, calling forth Bugg's regrets that the 'whole of Mr Faber's remarks have I believe been transcribed into the pages of the *Christian Observer*'.⁵⁸ The editor tried to avoid controversy, but correspondents brought it up. The editor, S C Wilks, attempted to steer a careful course, ensuring that the anti-geologists were always answered, relying on W D Conybeare for geological guidance. From 1827 the division between Bugg and Faber dominated several volumes, and at times the correspondence became acrimonious, with articles such as 'On the infidel tendency of certain scientific speculations', (34, 1834, pp 199-207) to be followed by a poem by S C Wilks on 'The Fossil Shell' and then 'Replies to a Layman on Geology' (pp 306-16).

To those brought up on White's conflict thesis, most baffling is the *Quarterly Journal for Science, Literature and the Arts* – the house journal of the Royal Institution – as this journal contains more 'anti-geology' than the three Anglican journals put together. The editor in the 1820s was William Brande who succeeded Humphrey Davy as Professor of Chemistry at the Royal Institution. Despite these credentials Brande championed the young earth geology of the 1820s, regarding Granville Penn's *A Comparative Estimate of the Mineral and Mosaic Geologies* (1822) as 'a work abounding on sound doctrines, founded upon close reasoning' (1822 xxvii p 143) and next year did 'hail the appearance of Penn with unfeigned satisfaction'. The good churchman Buckland was less enamoured as mentioned above. Several issues in 1824-6 contained Brande's own version of geology later published as the *Outlines of Geology* in 1829. Ure's work was welcomed as 'one of the most valuable accessions made to the scientific literature of our country' – a marked contrast to the Christian derision from Bishop Sumner, Buckland and Sedgwick. The *Quarterly Journal for Science, Literature and the Arts* appears to have been unique among *all* journals in the 1820s in its espousal of a young earth and its dismissal of orthodox geology, though the *Evangelical Magazine* made a few noises in the same direction. That a secular institution should be so favourable to anti-geology should warn against an easy adoption of Genesis and geology battles, especially as the mainstream Anglicans and Presbyterians readily adopted geology and criticized anti-geologists. The evangelical flavour of the mainstream

58 George Bugg *Scriptural Geology* (London 1826-7) vol 1 p 4

churches cannot be too strongly emphasized as Boyd Hilton makes abundantly clear.⁵⁹

The mainstream Anglican and Scots Presbyterian approach to science of these decades is summed up in the Bridgewater Treatises of the 1830s, which, with the exception of William Kirkby, adopt an old earth, design-centred natural theology which can too easily be dismissed, as Wyatt and Rupke emphasize.⁶⁰ Whatever their shortcomings were, and these were to be perceived in the future, none show any conflict of science and religion. Many theologians of this period show a similar outlook, for example Phillip Shuttleworth in *The consistency of revelation with Human Reason* (1832). An example of Anglican evangelical fence-sitting is to be found in Charles Bridges' *The Christian Ministry* going through nine editions from 1829 to 1849, and recommending Paley, Sumner, McIlvaine as well as Gisborne, a young earther.⁶¹ As Bridges was a *conservative* Evangelical, this warns of the danger of identifying Evangelicalism, let alone orthodoxy, with literalism.

Before the 1820s the Nonconformist Evangelicals were far more likely to interpret the Bible literally, as the previous discussion on the *Evangelical Magazine* showed. By the time Victoria was on the throne, several of their leading scholars had accepted geological findings. Most notable was John Pye Smith, an able biblical scholar, who published *The relation between the Holy Scriptures and some parts of Geological Science* in 1839, originally given as the *Congregational Lecture* in 1838. Smith adopted a novel exegesis of Genesis 1, by arguing that God had recreated a small portion of the earth in six days and put Adam and Eve there. The rest of the planet had been there for millennia, and thus geological ages were accommodated into this scheme. It would be fair to say that there was a time lag in accepting geology by evangelical Congregationalists compared to the Established churches. Without going into detail, Pye Smith gave a good résumé of geological science, and was highly critical of anti-geologists. George Eliot read Pye Smith in 1841, but Karl's biography does not discuss her response, though his prejudice would prevent him from grasping any significance.⁶² In 1837, the relation of geology and Genesis also formed the core of the lecture and was published as *The Holy Scriptures verified* by George Redford, who grappled with the issues in a muddled way, more or less accepting the Gap Theory, and for his geology looking to Fairholme and Gisborne, two young earthers, and Buckland, and thus is somewhat self-contradictory.⁶³ The muddled nature of the book

59 Boyd Hilton *The Age of Atonement* (Oxford 1988/1991) especially pp 22-3

60 Wyatt *Wordsworth and the Geologists, passim*, Rupke p 246

61 C Bridges *The Christian Ministry* (1829 6th edn 1849 repr London 1858) pp 36-7

62 F Karl *George Eliot* (1995 London) p 46

63 G Redford *Holy Scripture verified* (London 1837) pp 25, 33f

indicates that the author was not a dogmatic literalist but rather someone grappling with the issues, and possibly putting pen to paper before his own mind was clear.

Commentators frequently adopted a non-literal approach to Genesis, most notably the Free Kirk Robert Candlish. To go to the opposite ecclesiastical extreme one may cite Nicholas Wiseman whose treatment of Genesis and geology in *Twelve Lectures on the Connexion between Science and Revealed Religion* (1836) leaned heavily on John Sumner. The geological and other scientific parts of Wiseman's lectures are very similar to the consensus of Anglicans and Presbyterians of the same period. Andrew White cited Wiseman as 'that one great Christian scholar [who] did honour to religion... by... accepting the claims of science'. He then goes on to say that, 'the conduct of this pillar of the Roman Catholic church contrasts admirably with that of timid Protestants who were filling England with shrieks and denunciations'.⁶⁴ In fact, Wiseman quoted profusely from those 'timid Protestants'!

The Opposition of the Anti-Geologists

However this 'tranquil' relationship of Genesis and geology is not the whole story, as some Christians did want to protect the literal truth of Genesis from the infidel geologists and their wayward clerical supporters. The flowering of 'anti-geologists' which came as a deluge in the mid-twenties annoyed both Uniformitarian and Catastrophist alike. Their cry was that geologists were mistaken and ungodly. Some had good scientific credentials, like Brande of the Royal Institution and Ure of Glasgow, others were Evangelicals eg Bugg, Fairholme, Nolan, or traditionalists eg Vernon Harcourt (brother of the co-founder of the British Association), Dean Cockburn of York, and Edward Nares. Despite their variety, the anti-geologists had a common theme; the earth was a few thousand years old being created in six, twenty-four hour days, and the strata were laid down in the Noachian Deluge. Many emphasized that there was no death or suffering before the Fall (Genesis 3) and thus no animals had lived for more than a few hours before Adam. This was to retain the centrality of the Atonement, as death is the curse of sin. (Most orthodox Christians eg Sumner, Chalmers, Wilberforce did not reckon that animal death before the Fall affected the Atonement. In 1838 Buckland waxed eloquent on this in a sermon on *Death*.)

George Bugg stated in his combative *Scriptural Geology* of 1826: 'Whatever is contrary to that Bible must be false.'⁶⁵ What Bugg meant

64 White 'The Warfare of Science' pp 223-4

65 Bugg *Scriptural Geology* vol I p 16

was: 'Whatever is contrary to a *literal interpretation* of the Bible...' Most anti-geologists believed the literal view of the Bible was the correct interpretation, and Bugg condemned any non-literalists, however evangelical they were. The anti-geologists were (and are) not alone in that. To many people, whether today or last century, Christian orthodoxy means literalism, and thus opposition to geology and evolution. More recently this has been revived by scientific creationists. However, though literalism is a recurrent phenomenon within the churches, it is very questionable whether it is the traditional and orthodox view.

It is easy to overstate the importance of the 'anti-geologists' as they had a high profile and attracted much attention, particularly in retrospect. The anti-geologists were not representative of Christians as they were attacked most vigorously by other Christians, as is shown by the response to Ure's *A New System of Geology* (1829). Andrew Ure (1778-1857) was Professor of Chemistry in Anderson's College, Glasgow from 1804 to 1830 and is remembered for his bizarre variation of passing electric currents through frogs' legs. In November 1818 at Clydesdale he experimented on the effect of passing a large current through an executed criminal's corpse. The effect was electric! As Ure wrote: 'when the supra-orbital nerves were excited, every muscle was thrown into fearful action'; or as Byron wrote: 'And Galvanism set some corpses grinning.'⁶⁶ In 1821 he published the *Dictionary of Chemistry* which was used by Erasmus and Charles Darwin in their laboratory at *The Mount* in Shrewsbury.⁶⁷ His opus on anti-geology *A New System of Geology, in which the great revolutions of the Earth and Animated Nature, are Reconciled at once to Modern Science and Sacred History* (1829) received a glowing review by William Brande of the Royal Institution but was heavily censured by Sedgwick for its inaccuracies and anonymously in the *British Critic*. This reviewer was identified by Lyell, writing to Scrope: 'A bishop, Buckland ascertained [we suppose Sumner], gave Ure a dressing in the *British Critic and Theological Review*! They see at least the mischief and scandal brought on them by Mosaic systems.'⁶⁸ Lyell was not one to mince words, and wrote: 'Longmans paid 500 guineas to Mr Ure of Dublin... It is to prove the Hebrew Cosmogony and that we ought all to be burnt in Smithfield.' Ure had tried to restrict geology to a few thousand years. He also postulated an extra day of creation, necessary to repopulate the earth after the Flood. As an aside, there is no evidence either way, whether Brande's colleague Michael Faraday supported anti-geology.

66 Lord G Byron 'Don Juan', Canto i, Stanza 30

67 Smith and Burkhardt edd *Correspondence of Charles Darwin* (Cambridge 1985) vol i pp 6, 29

68 K Lyell *Life, Letters and Journals of Sir Charles Lyell, Bart* (London 1881) 2 vols, vol I p 238

The most senior clerical anti-geologist was Dean William Cockburn of York, as their numbers did not include a bishop. For ten years Cockburn fought long and hard against the infidel geology, particularly addressing Buckland and Sedgwick, and when York hosted the British Association, delivered a blistering attack on them. In 1838 Cockburn published a pamphlet *A Letter to Prof Buckland concerning the Origin of the World* striving to demonstrate that real geological facts are incompatible with Buckland but compatible with *Moses*. In a diatribe to Murchison he stated that there is 'no valid reason for supposing that all the Eocene, Miocene and Pliocene' were deposited in a time which 'exceeded three days', which is fairly fast for 100,000 feet of strata, thus concluding that 'the opinion of common sense will ultimately prevail'. 'Common sense' means that these strata must have been deposited at the rate of twenty-three feet per minute!

Cockburn not only drew the ire of the 'Reverend Geologists' but also of Lyell, who wrote to his sister in September 1839 after staying with Sir Robert Peel. After giving some harsh strictures on Cockburn, Lyell had turned to Peel and said: 'Bye the bye, I have only just remembered that he is your brother-in-law', to which Peel replied: 'Yes, he is a clever man and a good writer, but if men will not read any one book written by scientific men on such a subject, they must take the consequences.'⁶⁹ But as Cockburn wrote in 1844: 'The Philistines are beaten with the very weapons they had prepared against us, and the head of Goliath [sic] is cut off with his own sword.'⁷⁰ Ironically Cockburn's ministry ended in financial scandal.

It is difficult to ascertain how these controversies affected the man in the pew or even the many unchurched. Some insight can be gained from the diaries of a Shropshire lady, Louise Charlotte Kenyon of Pradoc, near Oswestry. Her diaries from 1822 to 1836 are fascinating to read alongside Darwin's correspondence for the same period. Her physician was Dr Robert Darwin and in 1833 her daughter Charlotte married the Reverend John Hill, who had been previously engaged to Fanny Mostyn Owen, who had sent a series of love letters to Charles Darwin in 1828. In the 1820s Louise attended chemistry lectures in Oswestry and after her daughter's wedding made a close study of geology, quoting the *Christian Observer*: 'Geology is one of the most interesting subjects that can occupy the mind of man' and then read first Penn and then Ure, followed by Mr Murray's *Truths of revealed religion* 'in which he proves by *geology* the truth of the Mosaic account of creation'. This interest lasted for four months after her daughter's wedding, although over the next decades she either organized or gave scientific talks at Pradoc church. However, geology worried her, and

69 Lyell *Life Letters and Journals* Vol II, p 51

70 W Cockburn *The Bible defended against the British Association* (London 1844)

she asked her daughter-in-law to help by writing to the Rev J Cornish who replied on 6 November 1856, seeking to wean her away from anti-geology. The letter indicates just how real the problem of geology was for some Christians.⁷¹

Liberal geologists like Lyell scorned anti-geologists and let the more evangelical geologists deal with them. Reading the literature highlights the internecine warfare among orthodox Christians. Geologists like Sedgwick, Buckland, Conybeare and Miller criticized fellow Christians of very similar beliefs. This quarrel dominates the pages of the *Christian Observer* from 1825 until 1840, with the editor, the Reverend S C Wilks, striving to ensure the young earthers got off worst. A similar internecine warfare has been going on since 1961 among British and American Evangelicals.⁷²

The *Harmony* of Genesis and Geology

During the next few decades there were numerous harmonies of geology and Genesis, of varying quality. Though many were anti-geologies, the majority accepted geology and propounded their harmonies in varying degrees of geological competence, the most widely available being Buckland's Bridgewater Treatise which outsold them all. By the 1850s the vast majority of educated Christians accepted geology, the enthusiasm for anti-geology having waned, thus evincing the astronomer the Reverend Richard Main's comment in the highly conservative *Replies to Essays and Reviews* (1862) edited by Samuel Wilberforce: 'No educated Christian accepts 4004 BC as the date of creation.' Christians accepted geology at different rates. Often the holding of a literal Genesis and non-acceptance of geology in the 1820s was not a dogmatic allegiance to literalism as is shown by Dean Close, who published a literalist exposition of Genesis in 1825 without considering geology.⁷³ Thirty years later, while Dean of Carlisle, Close gave a lecture at Exeter Hall for the YMCA and positively drooled over Miller's *Testimony of the Rocks*.⁷⁴ Some still published anti-geologies only to receive the full force of Miller's pen. Phillip Gosse's unusual and logically irrefutable *Omphalos* in 1856 which argued that God had created the world with an apparent vast age a few thousand years ago made no impact at all. Kingsley reckoned that this would make God a liar. After Edmund Gosse wrote his not always reliable reminiscences in *Father and Son*, Phillip Gosse came to be regarded as typical of mid-century Christians, probably because Son made Father known as a Christian

71 Diaries of Louise Charlotte Kenyon of Pradoc 1801-1836. Rev J Cornish to Mrs Charlotte Hill (nee Kenyon) 6 November 1856, 549/407 Public Record Office, Shrewsbury

72 R L Numbers *The Creationists* (New York 1992)

73 F Close *The Book of Genesis considered and illustrated* (London 1826, 6th edn 1841)

74 F Close 'Hugh Miller's "Testimony of the Rocks" – God in his word and in his works' (London 1858) pp 239-72

reactionary.

Most typical of the 1850s are the volumes by Pratt, Hitchcock and Miller. Josiah Pratt was Archdeacon of Calcutta, and in the midst of his clerical duties published some early work on the geophysics of the Himalayas. An avowed Evangelical, he published *Scripture and Science not at variance* in 1856 and revised it in 1871. However in 1871 he still held fast to the Gap Theory, being a strong old earther, and was unconvinced by Rorison's poetic view of Genesis 1 put forward in *Replies to Essays and Reviews*. From its title the American Edward Hitchcock's *The Religion of Geology* (1853) sounds unpromising. Hitchcock was no mean geologist, and was aggressive in justifying geology to a sometimes sceptical audience, such as the Hebraist, Moses Stuart, a literalist who rejected geology. Hitchcock saw the problem as being caused by too literal a reading of *Paradise Lost* and that 'the theologians having so mixed up the ideas of Milton with those derived from inspiration', thus giving rise to Colenso's complaint: 'The truth is that we literally groan, even in the present day, under the burden of Milton's mythology,'⁷⁵ Though Colenso was notorious for his views on biblical criticism in the 1860s, his approach to Genesis 1 was similar to that of Evangelicals and he quoted extensively from them. As far as geology and Genesis was concerned, Colenso was no more heretical than Hitchcock, Pratt, Pye Smith or Richard Main.

Pride of place must go to Hugh Miller's *The Testimony of the Rocks* which consists of essays edited shortly after his tragic death, when he was found dead in his bathroom, with a pistol lying beside him. The first two essays are excellent summaries of geology and his chapter on anti-geologists is as entertaining as it is devastating. This volume also marks the beginning of the end for the Gap theory – except for nascent Fundamentalists and Dispensationalists. Though Miller was an evangelical apologist he was highly regarded for his geological abilities, and encouraged the geologist Archibald Geikie in the 1850s, which Geikie recorded in his autobiography *A Life's Long Work*. Opportunity for Geikie to show his appreciation came 'when the centenary of Hugh Miller was celebrated at Cromarty in 1902'.⁷⁶

Far more theological is *The Bible and Modern Thought* by T R Birks, written in response to *Essays and Reviews*. Birks was a leading mid-Victorian evangelical theologian, who became Professor of Moral Philosophy at Cambridge in 1872 and married into the Bickersteth dynasty. The work is a wide-ranging and learned response to the Essayists

75 E Hitchcock *The Religion of Geology* (Glasgow 1851) p 78; J W Colenso *The Pentateuch and the Book of Joshua* (London 1863) vol IV p 148

76 A Geikie *A Long Life's Work* (London 1924) p 60

dealing with revelation, the historicity of the Bible, miracles and the inspiration and interpretation of Scripture, and adopts a mild critical approach to the Bible. To adopt modern terminology, Birks was conservative but definitely not Fundamentalist. One chapter (XIV) is on 'The Bible and Modern Science' and is an examination of Goodwin's Essay on *Mosaic Cosmogony*. Birks strongly rejected Goodwin's mythological approach and has reservations on Rorison's poetic interpretation and Miller's optical presentation, regarding the Gap Theory of Chalmers as the 'true relation of Genesis and Geology'. Both here and in the thirty-five page appendix on geology, Birks demonstrated his understanding and knowledge of contemporary geology, and made much of Alcide d'Orbigny's concept of a long series (at least thirty-five) of creations followed by extinctions, which gave rise to the geological concept of the *Stage*. D'Orbigny's work is commemorated with an explanatory plaque between Arromanches and the aptly named le Chaos on the Normandy coast. Birks and the other writers combined a conservative, but non-literalist theology, with a considerable expertise in geology; 'amateur' in the case of Birks and 'professional' for Miller, Pratt and Hitchcock.

These four are representative of the moderate, scholarly Evangelical. Some were less moderate but no 'anti-geologists', as is shown by George Eliot's long essay on the immoderate Evangelical – John Cumming. He wrote at least twice on science, first a lecture given at Exeter Hall in 1851⁷⁷ and then his peculiar *Church before the Flood* (1854) which had neither the erudition or balance of the previous four writers. Eliot's criticisms of Cumming are fair and devastating,⁷⁸ but too rapid a dismissal of Cumming will miss an essential point. Cumming is a representative of the most conservative of conservative Evangelicals in a decade when the churches were more conservative and literalist than they ever had been. Yet despite some ingenious exegetical acrobatics on Genesis, Cumming accommodates the whole of geology into the first two verses of Genesis. Joseph Baylee, Principal of the Anglican theological college, St Aidan's Birkenhead, was also an ultra-conservative, who wrote on geology and Genesis.⁷⁹ On a first reading it appears literalist, but in fact allows orthodox geology to sit alongside, or rather inside, his almost literalist Genesis. This acceptance of geology is easily lost in a cursory reading as Baylee claims to be literalist, and it demonstrates the need to study Victorian (or any) writing on their terms and not with spectacles provided

77 J Cumming 'God in Science' in *Letters to Young Men* (London 1851) pp 199-242

78 G Eliot 'Evangelical Teaching: Dr Cumming' *Westminster Review* 8 (October 1855) pp 436-62 (repr J Moore ed *Religion in Victorian Britain* Vol III (Manchester 1988) pp 220-2

79 J Baylee *Genesis and Geology* (Liverpool 1857) repr J Moore ed (1988) *Religion in Victorian Britain* pp 178-85

by the twentieth century. The exegesis may not be convincing, but it shows how the ultra-conservatives did not always reject geology, as they have done this century.

Historical Distortions

By the 1860s very few educated Christians in Britain or America did not incorporate geology into their belief by one or other exegetical device, thus supporting Main's contention. Almost the only exceptions in Britain were the Plymouth Brethren, B W Newton and P Gosse. There were probably some from mainline churches but they have so far escaped my researches. Though there was hostility to evolution especially in the sixties, this was simply over the possibility of evolution, as without exception no critics of evolution rejected geological ages. (I stand to be contradicted, and ought to say that I have found no exceptions, but not through lack of trying.) In America the main dissidents were Moses Stuart and R L Dabney and others from the Southern Presbyterians who wished to preserve Genesis to justify slavery.

Despite this, the prevailing opinion is that in the first half of the nineteenth century the majority of educated Christians were biblical literalists, and thus had a problem with geology. Let us, for example, consider two writers commenting on George Eliot. First is David Lodge's introduction to the *Penguin Classics* edition of *Scenes of Clerical Life*. Writing of the year 1839, Lodge says: 'At this period, when most Christians believed in the literal truth and verbal inspiration of the Bible, orthodox theologians were mounting a desperate defence against the findings of geological science...'⁸⁰ Does that mean Sumner, Pusey, Sedgwick, Pye Smith, Buckland, Conybeare, Chalmers, Miller, Fleming and the editors of the *Christian Observer* and, above all, the notorious Soapy Sam were not *orthodox*? It is the same with Frederick Karl's biography of Eliot writing of the same period: 'In the years preceding Darwin's *Origin of Species*, geology was the giant that could topple the church. Geological findings... seemed to hold the fate or validation or subversion of biblical thought.'⁸¹ Some works of church history are no better, and Vidler's standard work *The Church in an Age of Revolution* simply gets it wrong:

F D Maurice, for example, in the 1850s was still talking about the world's being only 6000 years old. [He was not!] The world had been created by divine fiat... The first rumblings of trouble ahead, for all who were fixed in these beliefs, came from the science of geology. In

⁸⁰ G Eliot *Scenes of Clerical Life* (Harmondsworth 1973) 'Introduction' by David Lodge

⁸¹ Karl *George Eliot* p 129

the 1830s books by Sir Charles Lyell and Dean Buckland established the geological successions of rocks and fossils and showed the world to be much older than the accepted date for the Garden of Eden.⁸²

Each of these highlight the common misinterpretation of the relation of Genesis and geology in the nineteenth century, and help to ensure that the misunderstanding is perpetuated, preventing one from grasping what was the mind of early Victorian orthodoxy, which was neither literalist nor anti-science. To be mistaken on these two central points prevents a student from understanding what the Victorian crisis of faith was about. This study has been narrowly focused on Genesis and geology, or literalism and science, and may raise an implicit challenge to other widely held interpretations. On 6 April 1839, the Chartist publication the *Western Vindicator* claimed that the geologists agreed with Scripture that man is the last stage of creation. At this point most Christians agreed with the Chartists.

Conclusion

Writing close to the 6000th anniversary of the earth's creation according to Ussher's calculations of 1650, one finds that, despite popular understandings, Ussher's date was not widely held in the decades before 1859, and reports of warfare between geology and Genesis are greatly exaggerated. In fact the converse is true, as from 1790 to 1860 the majority of educated Christians, including most Evangelicals, positively embraced geology and rejected biblical literalism. During the first half of the nineteenth century geology could be deemed the evangelical science. With the rise of modern Creationism that could not be said for the present day.

Despite this, there has been the dominant *perception* that *orthodox* Christians were literalists and regarded geology as infidel. This stems from the exaggerated memories of past conflicts, and typified by Edmund Gosse and Huxley, with the myth being codified in Andrew White's *magnum opus*. As a result much contemporary understanding of geology and Genesis is highly distorted and slews the understanding of the Victorian crisis of faith.

To conclude with a Scottish Evangelical commenting on the Disruption of the Scottish Kirk in 1843, when Thomas Chalmers led out a third of the General Assembly and most of the Evangelicals, leaving behind a church dominated by *Moderates* or Liberals. As Hugh Miller described the event in *The Witness*:

82 Vidler *The Church in an Age of Revolution* p 114

On the one side we saw *Moderate* science personified in Dr Anderson of Newburgh – a dabbler in geology, who found a fish in the Old Red Sandstone, and described it as a beetle: we saw science not *Moderate* [ie Evangelical], on the other side, represented by Sir David Brewster.⁸³

And when it comes to the Bible and science in the nineteenth century, many have confused Ammonites with Serpents.

MICHAEL ROBERTS is Vicar of Chirk, near Wrexham.

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83 H Miller 'The Disruption' in *The Headship of Christ* (Edinburgh 1870) p 476