

Genesis Chapter 1 and geological time from Hugo Grotius and Marin Mersenne to William Conybeare and Thomas Chalmers (1620–1825)

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Abstract: In 1550 few questioned the ‘biblical’ age of the earth, but by the mid-nineteenth century no educated person accepted it. The change is considered to have been a period of conflict between Christianity and science over the age of the earth. In fact, the conflict was small because from the Reformation era most considered the bible to be accommodated to its culture and that at the beginning of time God created a Chaos, which was re-constituted in ‘six days’. This was put forward by Grotius and Mersenne, then by the *Theories of the Earth* of Burnet, Whiston and others and then by later writers to allow for geological time. This reached its climax in early nineteenth century Britain with Chalmers, Conybeare and Buckland, thus preventing any major conflict between geology and Genesis. The perceived conflict of these centuries is a matter of retrospective interpretation, which does not do justice to those Christian thinkers, like de Luc, Chalmers and Townsend who accommodated geological time with little conflict, and those like Patrick, Ray and Whiston who opened up the way for this accommodation to geological time in the seventeenth century. The conflict between geology and Genesis is one of retrospective perception rather than historical reality. Only a minority of Christians, as with the anti- or scriptural geologists of the early nineteenth century, considered there to be a conflict.

In the year 1550, no educated person doubted that the earth was only a few thousand years old, but by the year 1860, no educated person doubted that the earth was millions of years old. No better comment of the conservative Anglican view in the 1860s can be found than in Samuel Wilberforce’s *Answers to Essay and Reviews* where one contributor, the astronomer the Revd Richard Main, wrote ‘Some school-books still teach to the ignorant that the earth is 6000 years old No well-educated person of the present day shares that delusion’. The way in which this change of perception took place is often the stuff of myth and legend in which the church is perceived as thwarting every advance of science. The discovery by ‘geologists’ that the earth was millions of years old did not suddenly inundate Western society at the end of the eighteenth century, but rather, the discovery, or series of discoveries, resulted in a slow erosion and metamorphosis of previously held opinions that the earth was young. As we shall see, those who introduced notions of an ancient earth were as likely to be Christian, whether lay or clerical, as not. Too often the story of this change is related in almost mythical terms, with the church opposing every suggestion of geological time because of their adherence to Ussher’s date of 4004 BC. Examples of this litter the writing of the history of geology.

There are several reasons why this chapter considers the period from 1620 to 1825. First, at the

beginning of this period, the book of Genesis (and all of the Bible) was seen as a reliable historical source and by 1825 most educated Christians regarded the ‘events’ of Genesis Chapter 1 as relating to a period of millions of years. Secondly, as geology may be considered to have started with the work of Steno in the 1660s, theologians in the 1620s could have no notion of geological time and cannot have been influenced by new notions of deep[ening] time. Thirdly, by considering numbers of writers, Christian or not, over the following two hundred years, the way they related ‘deepening’ time to the book of Genesis can be traced (though this is not a linear progression). My single focus is on Genesis Chapter 1 and time and I have ignored the question of Noah’s Flood (superbly discussed by Young 1995), the ‘fall’ of Genesis Chapter 3 and the vast longevity of the early patriarchs.

I also attempt to consider the book of Genesis in the terms it was understood at a given period and not retrospectively to judge writers by recent understandings of Genesis as myth or any other genre. This is unapologetically anti-Whiggish and allows one to put all writers discussed into their historical context and how they related to wider spheres of thought of their day. Seventeenth century writers had neither the benefit of the *Epic of Gilgamesh* nor radiometric age-dating. To fail to understand this would result in a history of the interaction of geology and the book of Genesis which is a myth

in the pejorative sense. None of the writers I discuss, with the possible exception of Buffon, considered the book of Genesis as myth in the other sense. To most it was reliable history, albeit it accommodated to the thought of the ancient Near East.

The most significant period in the history of geology as regards the age of the Earth is from 1760 to 1830; before 1760 few accepted the age of the earth to be measured in millions of years and after 1830, if not before, no geologist could deny it. Recently, this has been superbly charted by Rudwick (2005). These seventy years were a period of transition, both in geological understanding and how the Christian church understood the implications of deep time for their theology. These interpretations centre on the first chapter of Genesis, but it is too easily assumed that before the rise of geology the calculations of Archbishop Ussher were in some way the official view of the church. However, until about 1750 there was little questioning of a young earth some thousands of years old, whether six or sixty millennia. Since before 1760 there was little in the way of evidence for an ancient earth it is as absurd to cavil at Ussher, Calvin or Aquinas for not dating the earth at 4.6 billion years as to cavil at Darwin for not knowing about genetics.

Historical background

Before 1650, the first chapter of the book of Genesis could not be interpreted in the light of scientific evidence on the possible age of the earth, but there was a great diversity in how theologians interpreted Genesis. The Church Fathers of the first five Christian centuries demonstrate this diversity. The anonymous *Epistle of Barnabas*, which was written between AD 70 and 135, states in Chapter 15 that the earth will last only six thousand years. A century later, Theophilus of Antioch in about AD 180 interpreted Genesis Chapter 1 somewhat literally and calculated the creation at 5515 BC (Theophilus 1970, pp. xxiii–xxv). Augustine of Hippo was ambivalent, seemingly both holding a figurative sense of day and a literal one. Other Church Fathers were clearly figurative and allegorical in their biblical interpretation (Van Till 1996).

The period of the Reformation resulted in a more rigorous biblical interpretation with an emphasis on the literal, or plain, rather than allegorical, meaning of scripture. This inclined most theologians and savants to understand the ‘day’ of Genesis Chapter 1 as of twenty-four hours and thus the earth to have been created in about 4000 BC, be they Luther, Calvin, Mercator, Raleigh or Columbus. Despite the emphasis of both Roman Catholic and Protestant exegetes on the ‘literal’ meaning of Scripture, this ‘literalism’ never went to the

extreme of insisting on a flat earth, which is demanded by a literal reading of Genesis 1:6–8, and Exodus 20:4. In fact, very few Christian theologians had ever considered the earth to be flat, a myth demolished by Russell (Russell 1991). Literalism was tempered by ‘accommodation’. This refusal to adopt a slavish literalism can be seen clearly in Calvin’s understanding of the accommodation of Scripture. In 1554, eleven years after Copernicus published *De revolutionibus*, Calvin published his commentary on Genesis in Latin. Calvin made no reference here, nor probably anywhere else, to the Copernican theory, but he stressed that Genesis was not written to teach astronomy. As he dealt with the Mosaic description of the firmament of Genesis 1 he wrote, ‘He, who would learn astronomy and other recondite arts, let him go elsewhere’ (Calvin 1847, p. 79). He considered the firmament of Genesis 1:6–8, not to be the solid crystalline dome, which is implied by Egyptian astronomy, but a representation of rain clouds, because ‘nothing is here treated of but the visible form of the world’ (Calvin 1847, pp. 69–88). Calvin was wrong at this point as most ancients considered the firmament to be a solid dome. But he considered that Moses accommodated himself to the limitations of human thought and as Calvin commented on Genesis 1:15, ‘For as it became a theologian, he had respect to *us* rather than the stars’. Calvin approached his task with Ptolemean assumptions of a spherical rather than a flat earth. He also did not question a 6000-year-old earth nor a universal flood. Calvin’s accommodating interpretation eased the path for many Calvinists to accept Copernicanism, with the result that some Roman Catholics referred to the ‘Calvino–Copernican’ theory. In the following centuries Calvin’s doctrine of accommodation allowed devout Protestants to accept the findings of science, whether astronomy or geology, without the rejection of the authority or the teaching of scripture (Hooykaas 1972, pp. 114–130).

Alongside the rather literal exegesis of the Reformation era, many writers considered the earth being created ‘without form and void’ as described in Genesis 1:2 to be paralleled by many classical writers, such as Ovid (5th Book of *Metamorphosis*) and Hesiod, who wrote of the formation of an original chaos. Thus Genesis Chapter 1 was interpreted as God first creating chaos (i.e. without form and void), which lasted for an unspecified period, and then reordering this chaos in six days. This chaos-restitution interpretation of Genesis, in fact, opened up the way for a longer timespan of creation, as the duration of chaos was undefined. The duration of chaos varied from a mere twelve hours with Ussher in 1650 to millions of years with Chalmers in 1803.

Over the next 300 years, the wrestling of theologians with the implications of the sciences of space and time was almost an interplay of literalism, accommodation and chaos. The apparent literalism commonly obscures an openness to science, which may be lost by an emphasis on the alleged warfare of science and religion over a flat earth, geocentricity, the age of the earth and, finally, evolution. This reached its canonical form in the Victorian works of Draper and White (White 1955), and is still frequently re-iterated in more popular works on science.

The seventeenth century

One of the features of the Renaissance as understood by the churches was that all knowledge was part of a unified whole and thus ‘biblical history’ was related to other spheres of knowledge, both classical and modern. Thus the book of Genesis was not considered in isolation but with reference to those classical writers who spoke about chaos and creation. Hesiod and Ovid, among others, reckoned that chaos was created first, followed by its ordering. Many commentators quoted the opening lines of Ovid’s *Metamorphoses*, which describes the ‘rude and undigested heap’, which preceded the creation of the sea, land and sky (Williams 1948, p. 49). The undigested heap of chaos was regarded as the equivalent of the world being ‘without form and void’ (*tohu va bohu*) in Genesis 1:2. This equating of chaos with ‘without form and void’ with a significant passing of time between the initial creation and the ordering in six days is held by four important writers of the early seventeenth century; Grotius, Mersenne, Bacon and Descartes. Hugo Grotius, a Dutch Protestant, in *The Truth of the Christian Faith in Six Books* argued that ‘the most antient tradition among all Nations [Phoenician and Greek] is exactly agreeable to the Revelation of Moses’ (Grotius 1719, section XVI) and his work was later translated and widely available and used throughout Europe. Many later writers, for example Thomas Chalmers, cited Grotius in support of a chaos of undefined duration, opening the door for geological time (Chalmers 1838–1842, Vol. 1, p. 181). Mersenne, Roman Catholic priest–mathematician, wrote a massive commentary of early Genesis adding much mathematics to his exegesis which included many references to classical writers, supporting his somewhat mathematical version of the chaos–restitution interpretation (Mersenne 1623, pp. 718–719).

A few decades later Ussher (1650–1654) published *Annales Veteris et Novi Testamenti* which gave the date of creation as the evening before ‘*vigesimum tertium diem Octobris ... in*

anno periodi Julianae 710’ (Ussher n.d. Vol. VIII, p. 13), which translates to 4004 BC. Ussher only allowed the initial creation which was ‘*inanis et vacua*’ (without form and void; Genesis 1:2) to last until the first morning. Humans were created six days later (Ussher n.d., Vol. VIII, pp. 14–15). Many other writers of the sixteenth and early seventeenth century also favoured a date of about 4000 BC (Fuller 2001, 2005), though some allowed an indefinite duration of chaos. Although his chronology from the first humans in 4004 BC to the time of Christ was widely accepted until the 1830s, his strict understanding of six days and a twelve hour ‘chaos’ was not, and was a minority opinion over the next 150 years. Ussher’s work is, in fact, a fine piece of serious chronology of its day. His chronology from the beginning of the Hebrew monarchy from about 1100 BC to the end of the exile in the late sixth century BC more or less stands, but only a strict fundamentalist would accept his chronology before King Saul. His influence on the churches is grossly exaggerated and many writers passed over him in silence. Though his date of 4004 BC for creation is to be found in many English bibles after 1701, that notorious date was never official doctrine.

Towards the end of the seventeenth century a large number of theories of the Earth were published, mostly in Britain by writers such as Burnet, Whiston, Woodward, Ray and Hobbes (Roberts 2002, pp. 144–150). These were an attempt to rationalize the early history of the earth into six days to uphold the text of Genesis. The authors allowed an indefinite time for chaos and combined Genesis, classical writings, scientific observation and speculation into a fascinating mélange of ideas. Burnet wrote of the indefinite chaos, ‘so it is understood by the general consent of commentators’ (Burnet 1681, chap IV, p. 30) and the commentator Bishop Patrick wrote of the duration of chaos that ‘(I)t might be a great while’ (Patrick 1854, Vol. 1, pp. 1–3). Exactly how long chaos lasted was never made explicit. Most accepted that the ‘days’ of Genesis 1 were of twenty-four hours duration, but Burnett and Whiston argued that each day of creation could have been a year in duration and the obscure William Hobbs suggested an even longer time basing his ideas on 2 Peter 3:8; ‘one day is as a thousand years’ and ‘I say, why may not one such day, be equal to many years’ (Hobbs 1979, p. 110). Writing about Whiston (Whiston 1696), who extended each day to a year, Stephen Gould said that this ‘was a big step in the right direction’ (Gould 1991, p. 372).

The chaos–restitution interpretation was adopted by most commentators in the eighteenth century—and to mention a few ‘conservatives’—Calmet,

Wesley, Gill, Pantycelyn (writer of *Guide me O thou Great Redeemer*) and Horsley as well as poets such as Milton, Traherne and Pope (Roberts 2002, pp. 150–155). This interpretation formed the basis for a libretto for a planned oratorio by Handel, which was acquired by Haydn in 1792 and used in *The Creation*. Secular writers, for example Maupertuis (1751) and Kant (1755), who made no reference to Genesis, also referred to the original formation of chaos before the ordering of the universe. The whole schemata of original chaos followed by development was an essential part of the eighteenth century worldview, whether Christian or not. The way was open for a longer time-scale.

The eighteenth century

Scientifically, Newton dominated the eighteenth century and the major advances in geology by de Luc, de Saussure, Hutton, Smith, Soulavie, Cuvier and Werner took place in the closing decades of the century. Simply, in 1700 the age of the earth was reckoned to be well in excess of 6000 years and by 1800 to be numbered in millions, except by de Luc and some others. Among theologians there was no uniform approach; however, most in the first half of the century were more flexible than Ussher. Though most commentators accepted the initiation of chaos followed by six days of creation, as the century wore on an increasing number allowed even more time. A mid-century example is the Anglican clergyman Thomas Stackhouse (1677–1752), who developed ideas of Patrick, Ray and Derham; ‘... this planetary world, ... was not immediately created out of nothing ... but out of some such pre-existent matter ... chaos. ... This seems to be part of God’s original Creation, but why he suffer’d it to continue so long before he transform’d it ... is only answerable to divine pleasure’ (Stackhouse 1744, pp. 2–3). Very few argued dogmatically for a rigid six days, though a significant minority, e.g. another Anglican, William Wall (Wall 1734), undogmatically accepted it. It is essential to distinguish between an eighteenth century theologian accepting a young Earth because they were unaware of geological evidence of antiquity and those who, like George Bugg, Granville Penn and Fairholme in the 1820s (Lynch 2002; Mortenson 2004) and modern young Earth creationists, were aware of the evidence but equated it with infidelity.

After mid-century an increasing number of savants became convinced of a vast geological time, and the theological accommodation to this kept in step with the developing ideas of geological time rather than reacting against it. Few theologians

actually opposed geology and then only in a mild way as in the case of William Jones of Nayland. Most ‘literalists’, like Thomas Scott (Scott 1788–1792), Kidder (1694) and Blair (1802) were apparently oblivious of geologists. Most of these were strictly biblical commentators, who did not refer to any kind of science. The most significant of ‘old Earth’ theologians are discussed below but there were several who do not fit into any of those groups. Thus in 1785 the Revd James Douglas presented *A dissertation on the Antiquity of the Earth* to the Royal Society. As well as geological observations (including those of William Hamilton on Vesuvius), he cited Grotius on the ancient writers and concluded that ‘Many well-informed persons have therefore been inclined to suppose that the earth was created in six expanses of time instead of six days’ (Douglas 1785, p. 40). He did not name the ‘many’, who probably would have included Whiston, Whitehurst, Buffon and de Luc.

Buffon and the French connection

One of the leading French commentators was Fr Calmet, whose exegesis of the book of Genesis in 1724 was similar to that of Bishop Patrick, but was far more guarded on the duration of the chaos, possibly restricting it to hours (Calmet 1724). Despite the Protestant/Catholic divide it is remarkable how similar exegetes were in both traditions.

The person who made the greatest impact on a changing understanding of Genesis was George-Louis Leclerc, Comte de Buffon, whose new interpretations are variously understood as a devout attempt by a not very devout man to respect revelation or as a counter-theology, ultimately to reject Christian theology. I favour the former. In 1749 Buffon published the first volume of *Histoire naturelle* in which he discussed the theories of the Earth of Whiston and others at length, as well as that of Scheuchzer. These he rejected in no uncertain terms and wrote of Whiston, ‘Whenever they allow themselves to interpret the sacred text by views purely human; ... they must necessarily involve themselves in obscurity’ (Buffon 1812, Vol. 1, p. 109). Yet, despite his dismissal of the *Theories of the Earth*, he absorbed much from them, especially notions of a longer time-scale than Ussher and others would have allowed. However, he scarcely touched on Genesis Chapter 1 and concentrated on pointing out how fallacious it was to use the deluge to explain the origin of all strata. It was his rejection of the deluge as a major geological cause rather than time that seems to have precipitated the conflict with the Sorbonne, though details of his dealings with the Sorbonne theologians are unclear (Roger 1997, pp. 186–190).

In the middle decades of the eighteenth century Buffon met and corresponded with Fr Joseph Needham, an English Roman Catholic priest and scientist. Needham was a skilled microscopist and the first Roman Catholic priest to be elected to the Royal Society. His *Nouvelles Recherches*, which were mostly on microscopy also outlined his understanding of Genesis (Needham 1769). Needham was happy to extend the understanding of ‘day’ to signify periods of different times and that the ‘day’ described by Moses probably represented periods of more than 24 hours, pointing out that even 60 millions of years are merely ‘*une partie infinitesimal de l’éternité*’ (Needham 1769, p. 54). Almost with echoes of Calvin, he wrote that ‘[e]n effet Moïse ecrie pour tout le genre human, et non pas pour les astronomies ou les philosophes’ (Needham 1769, p. 62) and cited Augustine in support. This demonstrates that accommodation was common to both Roman Catholic and Protestant.

Buffon returned to and lengthened his time-scale in *Époques* in 1778. His suggestions of 74 000 years and seven epochs are well-known, along with his unpublished estimate of the age of the earth of 2 million years. Buffon sought to bring his extended time-scale into line with Genesis in a manner that could be perceived as devout or undevout. Though he was hardly the most disciplined of Catholics, he cannot be aligned with *les philosophes* and their infidelity. His scientific and speculative arguments do not concern us but his theology does. In the *Premier Discours* Buffon devoted some dozen pages to the interpretation of Genesis (Buffon 1778, pp. 28–31). Compared to sixteenth century exegetes and Ussher (and the associated mythology) this is radical indeed, but compared to seventeenth century exegetes, Roman Catholic and Protestant, it is a moderate development and no more. It was also well within the bounds of contemporary orthodoxy as Buffon was no more radical than Needham. Roger considers Buffon to have based his ideas on Calmet, but there is only a general likeness, as Buffon gives no citation of Calmet. Further, Calmet, though writing fifty years earlier, gives no indication a long duration of time. Buffon’s ideas of the creation of an initial chaos followed by six lengthened days are similar to those of Needham and Whiston, both of whom were devout believers. Buffon had merely extended the conventional exegesis of Genesis. Whereas in his *Natural History* Buffon omitted all reference to Genesis Chapter 1 and criticized interpretations of the deluge, in the *Époques* he omitted any reference to the deluge and concentrated on a ‘stretched’ time-scale in Genesis. This may have been to forestall major criticism. It was difficult to condemn Buffon, without condemning Needham as well. Buffon had kept to as literalist a position as possible

and emphasized the generally accepted understanding of accommodation.

The reactions in France were mixed; the theologians at the Sorbonne and some other clergy were slightly uneasy (Roger 1997, pp. 422–423), Abbé Soulavie was favourable but Abbé Barruel less so. Barruel rejected the idea of chaos and held to a literal six-day creation in a forceful manner (Barruel 1823, Vol. 1, p. 373). The French Revolution interrupted possible later developments and when the church was restored a decade later its ethos was far more reactionary. This was the case for François-René de Chateaubriand (1768–1848) of Combourg in Brittany, who published the *Génie du Christianisme*, a Catholic literary *tour-de-force* reacting against the French Revolution. He rejected Buffon’s long time-scale commenting, ‘*Dieu a dû créer, et sans doute créer le monde avec toutes les marques de vétusté*’ (Chateaubriand 1966, Vol. 1, p. 147, 472). This can be translated ‘created the world with all the marks of antiquity and decay’, thus the world may appear ancient but is actually a recent creation. But he also wrote, ‘*Voyez l’admirable commentaire de la Genèse. par M. de Luc, et les Lettres du savant Euler*’ (Chateaubriand 1966, Vol. 1, p. 472).

De Luc and his letters to Queen Charlotte and Blumenbach

The Swiss-born geologist Jean Andre de Luc, who came to England in 1773 to be Reader to George III’s Queen Charlotte, was a friend of both de Saussure and Voltaire. He was also friendly with members of the Lunar Society. From 1776 he wrote many letters to the Queen, which were published in 1779. These letters were almost entirely on geology and its relation to the Christian faith. As these fill many volumes only a few highlights can be mentioned. Like Buffon he discussed Whiston and other Theorists at length and stressed that ‘*Moyse n’a donc voulu nous apprendre, ni la durée ni la manière de la création. Il nous a indiqué l’ordre successif de l’existence de parties distinctif de l’Universe*’ (de Luc 1778, Vol. 5, p. 639), thus reiterating an accommodationist view of scripture and here he concurred with Buffon, and, of course, with Calvin and many others.

From 1793–1795 de Luc wrote another series of letters to the German geologist Blumenbach, which was later republished in English in *The British Critic*. The Germans were more than amenable to a long time-scale in Genesis as in 1776 J. G. Rosenmüller had published a commentary in Latin allowing a long time for the creation. De Luc’s letters were wide-ranging in their discussion of geology and claimed that both Buffon and

Hutton had grossly overestimated geological time. De Luc was a Swiss Protestant and was at pains to reconcile Genesis and geology. He believed that geological time was far shorter than Buffon had suggested and that the world's continents had been formed only some 10 000 years ago. However, as Rudwick (2001) has recently pointed out, de Luc was instrumental in enabling geological time to be accepted as agreeable to Christian orthodoxy throughout Europe which was particularly significant for England. The publication of his *Traité Élémentaire de Géologie* in English in 1809 (de Luc 1809) gave a good account of geology just after 1800 incorporating a relatively short geological time-scale. The importance of de Luc is often under-recognized, due to his controversy over geological time with Hutton, who has often been given heroic status to the detriment of de Luc.

England and geological time

In 1701 the Stationers' Company inserted the date 4004 BC in an edition of the Bible for the date of creation, which was later included in many other editions (Fuller 2005). It has commonly been assumed that this was the Church's official or semi-official date for creation, and thus there was considerable ecclesiastical opposition to geology and its time-scale. This became one of the themes of Chapter 6 in Andrew White's *A History of the Warfare of Science with Theology* (White 1955), which has informed or misinformed many historical perspectives on geology and Genesis. A wide range of commentaries on Genesis does not support such ecclesiastical opposition in Britain, as most make no reference to Ussher and adopt some chaos–restitution interpretation. Only a handful of theologians adopted a strict six twenty-four hour day chronology for Genesis Chapter 1. Up to mid-century few if any writers adopted a long time-scale but after 1760 more and more did so. Those who did so were not exclusively from the liberal or latitudinarian wing of the church but included Evangelical and High Church Tories, and could have been as reactionary as was Chateaubriand across the Channel a few decades later. Thus three particular streams within the English religious scene will be considered, one radical and two conservative.

The radical stream is the Unitarian dissenting tradition, which could claim allegiance of several members of the Lunar Society, like the Wedgwoods. During the early eighteenth century a proportion of English Presbyterians began to question the Trinity and some local congregations left the Presbyterian Church to set up a Unitarian Church, as happened with the Darwins' family chapel in Shrewsbury. One Unitarian minister, the Revd

John Taylor, a tutor in theology at the Warrington Academy from 1757 (just before Joseph Priestley who went there in 1761) wrote in *A Scheme of Scripture Divinity* that 'God may still be creating new worlds in . . . space' and continued by giving the Mosaic 'account of the formation of the earth' beginning with chaos, but gave no indication of the duration of chaos (Taylor 1762, pp. 18–19).

From Warrington, interest moved to the Lunar Society with first John Whitehurst and then, less orthodoxly, Erasmus Darwin. Many members of the Lunar Society were interested in geology and were friendly with both Hutton and his opponent de Luc (Uglove 2002, p. 145). In 1778, John Whitehurst published *An Inquiry into the original state and formation of the Earth*: his approach to Genesis was similar to that of Buffon and to de Luc, though there is no evidence that they communicated with each other. His acceptance of vast time was tempered with caution as he wrote, 'The number of ages elapsed, since the Deity created, . . . will not, I presume, of a philosophical investigation' (Whitehurst 1778, p. 1) but in the second edition (1786) he was far more confident 'a few more ages will pass away before a satisfactory solution can be given' (Whitehurst 1786, p. 1). He wrote on the original chaotic state of the earth that 'This idea . . . not only coincides with the Mosaic account of creation, but also the opinions of most ancient poets and historians' (Whitehurst 1778, p. 11). Like Buffon, Whitehurst had slightly modified the previous consensus of Whiston and Patrick in the late seventeenth century.

In 1790 Erasmus Darwin published *The Botanic Garden*. Most was on aspects of botany but one section dealt with the original formation of the earth and reflects current understandings of creation and chaos:

—Let there be light! proclaimed the Almighty Lord.
Astonished Chaos heard the potent word:
Through all his realms the kindling Ether runs,
And the mass starts into a million suns;

These ideas are similar to those of Whitehurst, which is not surprising as they were associates. Darwin repeated his reference to chaos in *The Temple of Nature* of 1802. This is an exposition in poetry of the chaos–restitution interpretation and clearly supports a long timescale. Darwin was less orthodox than Buffon, but it is significant that he of all people incorporated Genesis and chaos in an otherwise secular poem.

Most would expect the Lunar Society to be progressive on the age of the earth but not the following two groups. The High Church Tories of the Church of England were often Hutchinsonian, who followed John Hutchinson's anti-Newtonian *Moses Principia* (1724) and thus inclined to literalism.

It is commonly assumed that evangelicals were hostile to science because of their biblicism. The High Church Tories came to the fore in George III's reign and were close to saying 'No King, No Church'. Though only a small group, they were very influential and included the Hackney Phalanx and clergy like William Jones of Nayland and Bishop Richard Watson; a few even became Bishops, including Horsley of St Asaph and van Mildert of Durham (Sack 1993).

Their main organ was *The British Critic*, which was founded in the 1790s by Archdeacon Robert Nares, William Jones and others 'to combat revolutionary tendencies and to defend the Church' (Altholz 1989, p. 24). Despite, or in spite of, the common Hutchinsonianism, articles in the journal were largely favourable to geology. From 1793 they published de Luc's letters to Blumenbach, possibly because his earlier letters to Queen Caroline meant that geology was acceptable in St James Palace if not Lambeth Palace. His influence with the Royal Family also enabled de Luc to influence the High Church wing, some of whose members inclined to Hutchinsonianism and a young Earth. Jones of Nayland (died 1800) is a case in point; in the 1780s, in a fine article on geological formations, he inclined to a young Earth in a non-contentious manner, but wrote that 'the drift of this [notions of antiquity] being to weaken the authority of the Bible' (Jones 1801, Vol. VII, p. 350). It is difficult to assess the influence of de Luc's views on the Church of England, but *The British Critic* had a circulation of 3500 in 1800, which means that a sizeable minority of the 10 000 or so Anglican clergy would have read of such ideas in a strongly orthodox High Church publication. In the early nineteenth century the Bampton Lecturer, Nares (1805, p. 314ff), as well as William Smith's (1769–1830) friend Joseph Townsend (Townsend 1813, p. 337ff) both referred approvingly to de Luc to support a moderate geological time-scale in accordance with Genesis. This is particularly significant at a time when Channing could dismiss Darwin's evolutionary opinions as Jacobin in the *Anti-Jacobin* (King-Hele 1999, p. 315). De Luc's letters give the strong message that geology and deepish time was acceptable to the Church of England but evolution was not. Richard Watson, Bishop of Llandaff, writing in 1788 accepted a high age of the Earth and in 1806 argued, like Playfair, that scripture merely fixed the age of man's existence. Yet Watson's theological writings were conservative.

There seems to have been little opposition to geology in the years before Trafalgar (1805), though Richard Kirwan and some contributors to *The British Critic* strongly criticized Hutton's geological ideas, which demanded far more geological

time than did de Luc. In his Bampton Lectures of 1805, Edward Nares, cousin of Robert Nares, presented a strong case for accepting the geology of de Luc, but in 1834 he found even the limited time-span of de Luc unacceptable and strongly opposed all modern geology (Nares 1834). Possibly the origin of the story of the churches' alleged opposition to geology at the end of the eighteenth century is the opposition to the very long time-scales of Hutton. On this, most Christian writers, except Playfair, aligned themselves with de Luc and his shortish time-scale of tens of thousands of years. Opposition to Hutton, who has heroic status, has been perhaps seen to be opposition to all geology. In 1800, the Earth was considered to be vastly older than a few thousand years, but whether it was many tens of thousands or millions was an open question. The choice was between Hutton and de Luc, not Hutton and Ussher. If a mark of orthodoxy was a commitment to a chronology limited to a few thousand years, then a very high proportion of churchmen, usually deemed orthodox in every other way, were well and truly heretical! The openness of churchmen in Britain of all stripes from radical dissenters through Roman Catholics to conservative Royalist Highchurchmen and Evangelicals does not sit well with Simon Winchester's recent claim that,

The hunch that God might not have done precisely as Bishop Ussher had suggested... was beginning to be tested by real thinkers, by rationalists, by radically inclined scientists who were bold enough to challenge both the dogma and the law, the clerics and the courts (Winchester 2001, p. 29).

The evangelicals

It is almost an axiom that early evangelicals were literalist and opposed to all geological findings, though this has more to do with the flowering of young Earth creationism than historical events. The evangelical revival began in the American colonies and Britain in about 1730 and grew slowly until the 1790s when number of evangelical Christians expanded rapidly on both sides of the Atlantic (Noll 2004). Largely because of their paucity of numbers they made little contribution until after 1800 and even then they were no more 'literalist' than their non-evangelical counterparts. In 1764 the Welsh hymnwriter and theologian William Williams (Pantycelyn) wrote an epic poem based on Genesis entitled *Golwg ar Derynas Grist* (A View of Christ's Kingdom). In an almost Miltonic manner Williams wove contemporary science and physico-theology into the Genesis text, beginning with the creation of chaos. Though he did not discuss time, the poem is best read if Williams considered the duration of the

earth to be more than 6000 years. Williams' work is similar to many of his contemporaries and not that different from Buffon and Whitehurst. In 1761 John Wesley produced a commentary on Genesis following the common chaos–restitution theme, as did the Baptist Calvinist John Gill (1748–1763).

In the late eighteenth century several evangelicals took a considerable interest in science, especially the chemists Farish, Milner and Francis Wollaston (brother of William) at Cambridge. In Bath, three local Anglican clergy, Joseph Townsend, Richard Warner and William Richardson, were encouraging William Smith in his geological work (Torrens 2001). Townsend was one of the second-generation evangelicals and for a time had been associated with the Countess of Huntingdon (Noll 2004) and seems to have retained his evangelicalism after returning fully to the Anglican fold, when he obtained a parish in Bath. Warner's and Richardson's attitude to Evangelicalism is unknown. All were aware of Smith's longish time-scale and in his volume *The Character of Moses Established for Veracity as an Historian* published in 1813 Townsend followed a chaos–restitution interpretation and, like de Luc, accepted a limited geological timespan (Townsend 1813).

The most significant evangelical contribution must surely be in Thomas Chalmers' Gap theory. Chalmers modified the traditional chaos–restitution exegesis by holding that the first period of creation i.e. of the chaos had existed for the whole of geological time and that all geological events occurred in this 'Gap'. After that God reordered the earth in six twenty-four hour days and humans were created some six thousand years ago. This had the attraction of both holding to a literal (almost) interpretation of scripture and an acceptance of geology. Chalmers first put this forward in some chemistry lectures at St Andrews in the winter of 1803–4 (Hanna 1852, p. 86, 381) and reiterated it in the 1810s. In 1802, Chalmers was a moderate Presbyterian minister, who later converted to evangelicalism, and probably developed his ideas in response to his fellow Scotsmen, Hutton and Playfair. Hutton and Playfair had raised issues of geological age in previous decades. Hutton was no Christian but Playfair was an ordained Presbyterian minister who dealt briefly with theological implications of geology in the *Huttonian Theory of the Earth*. Playfair parried objections to Hutton on the alleged inconsistency of high antiquity with the sacred writings by stating that the Bible 'seems to be but little interested in what regards the mere antiquity of the earth itself; nor does it appear that their language is to be understood literally concerning the age of that body, any more than concerning its *figure* or *motion*' (Playfair 1802, p. 126). In 1816 John

Bird Sumner, who was Archbishop of Canterbury from 1848 to 1862, presented a similar view in *A Treatise on the Records of Creation* (Sumner 1833). However another leading evangelical, G. S. Faber, favoured a day–age approach but was in a minority (Faber 1823). In *Outlines of Geology* Conybeare, an Anglican clergyman and later Dean of Llandaff, and Phillips discussed the theological interpretations of Genesis at length. They gently dismissed a literal view and clearly favoured the Gap theory over the day–age interpretation (Conybeare & Phillips 1822). The Oxford geologist, William Buckland, adopted a similar approach in his inaugural lecture of 1818 *Vindiciae geologicae* (Buckland 1820) in which he argued for a chaos–restitution interpretation. This he considered to be a continuation of the understandings of Townsend, Chalmers and Sumner and also the two old adversaries de Luc and Buffon (Buckland 1820, pp. 17, 22, 25–28). Buckland was propounding nothing novel and represents the culmination of two centuries of reconciling geology and Genesis.

For the next fifty years Chalmers' Gap theory became the commonest reconciliation of geology and Genesis only to be replaced by the day–age theory of Hugh Miller and others for conservatives and by a mythological view, forcefully put forward by Baden Powell in *Essays and Reviews* in 1860, for 'liberals' (Roberts 1998, 2002, pp. 159–161). After the Gap theory was rejected by more intellectual Christians after 1860, most conservative evangelicals and fundamentalists in Britain and America held a form of the Gap theory until it was eclipsed by young Earth creationism in the 1970s (Numbers 1992). This enabled most fundamentalists in the early twentieth century to accept the vast ages of geology, even if they rejected evolution.

It is irrelevant whether or not Chalmers' Gap theory was sound exegesis. Hardly any Christian accepts it in the twenty-first century and it has been vilified by young Earth creationists like Fields (1976) and Sarfati (2004). However, for a century it enabled even the most conservative Christians to accept the implications of geological findings and also prevented a serious conflict between geology and Genesis from 1800 to the 1960s when young Earth creationism came to the fore. However, from 1820 to 1850 there were major skirmishes from scriptural geologists like Bugg and Cockburn who insisted on a strict six-day creation. (Lynch 2002; Mortenson 2004). Apart from George Young none of these scriptural geologists had any geological competence, despite the special pleading of Mortenson. Even within the churches their influence was minimal. By the 1850s, hardly any educated Christians held to a 6000-year-old Earth, and recent studies on the

Christian response to Darwin demonstrates that few opposed Darwin on the grounds of defending a literal Genesis (Moore 1979; Livingstone 1987; Numbers 1998).

A problem of perception

In his fine volume on *The Secularization of the European Mind*, Chadwick wrote of the ‘two hypos-tatized entities of the later nineteenth century ... a mysterious undefined ghost called Science against a mysterious indefinable ghost called Religion’ (Chadwick 1975, p. 161). The parallel entities of the eighteenth century may be seen as the ever increasing duration of geological time of Enlightenment science and the hide-bound orthodoxy of both the Protestant and Roman church which clung to Ussher’s precise and brief chronology. Thus if a professing Christian writer, or even a Buffon, happily accepts the evidence for long (or even moderate as with de Luc) geological ages and that chaos or the days of Genesis must have had a long duration, then, at that point, Enlightenment thought had taken precedence over their orthodoxy (Mortenson 2004) and probably gave rise to inner tension. Recently Uglow has expressed this,

... Whitehurst faced a terrible dilemma as a careful observer, he should have been content to make deductions from the ‘facts’ he had collected, but these conflicted with his deeply held religious beliefs, which had taught him allegiance to the Mosaic story of creation and the Deluge ... The theological and the scientific fought each other within him (Uglow 2002, p. 151).

However she provided no evidence for this battle in Whitehurst’s soul. It is too facile to assume conflict between ‘orthodoxy’ and science without giving any evidence, as does Winchester on numerous occasions in his book on William Smith (Winchester 2001). This assumption is similar to the claims of Cannon (1978), Morrell & Thackray (1981, pp. 225–245) and Herbert (2005, p. 184) that the Anglican geologists, such as Sedgwick and Buckland, were liberal or broadchurch Anglicans and heirs to the latitudinarians, rather than orthodox. That was not the case. Sedgwick was an evangelical (Clark & Hughes 1890) and Buckland, Whewell, Henslow and Conybeare were close to being such. Buckland was encouraged by the evangelical theologians Sumner and Faber and the ultra-conservative Bishop Shute Barrington of Durham (Rupke 1983, p. 14), whereas Conybeare contributed to the evangelical Anglican journal, the *Christian Observer*, on matters geological. In England, as in Scotland, geology was acceptable to most evangelicals, despite their adherence to the Bible (Roberts 1998). The finest example of evangelical geological writing is Hugh Miller’s *The Testimony of the Rocks* (Miller 1857).

If it can be demonstrated, as it is frequently asserted (Blocher 1984, p. 41), that Christians only lengthened the Genesis day or the duration of chaos under duress from the weight of geological evidence then it would be reasonable to conclude that they had succumbed to, or compromised, Enlightenment thought. This is the implication of many writers, Andrew Dickson White, Gillispie, and, more recently, popular writers of history of geology like Cadbury and Winchester, and even young Earth creationist writers like Mortenson (2004) and Sarfati (2004), who wish to show that geological ages are the result of an ‘infidel’ Enlightenment. They have little credence for several reasons. First, there is a matter of chronology. Theological arguments for accepting a long, or rather a moderate, chronology preceded rather than followed geological findings, although the example of Chalmers is often wrongly presented as simply reacting to geological time. Secondly, Christian thinkers were open to a slightly longer time-scale long before geological evidence was apparent, as may be evidenced by Grotius, Mersenne, Burnett, Bishop Patrick and myriad others in the seventeenth century, who accepted a long duration of chaos and thus ‘deepish’ time, before there was any geological evidence for a great duration of time. And that is without going further back to the broader interpretations of Genesis of the church Fathers such as Augustine.

It is probably only the Hutchinsonians, Chateaubriand, Cowper, Barruel, the ‘scriptural geologists’ and a few others on one side and some *philosophes* on the other who fit neatly into such hypos-tatized entities of orthodoxy and Enlightenment. Most of those discussed in earlier sections accepted the science of their day and saw this in harmony with ‘traditional’ theology without very much internal or external conflict.

Conclusion

Throughout the three centuries from 1550 the churches’ changing understanding of geological time did not proceed in a gradual evolutionary manner, but was an erratic and muddled process like all human activity and thought. However, neither was it bigoted resistance to the irrefutable claims of science. It is probably better to say that the churches’ and geologists’ understanding of time co-evolved with a certain amount of ‘competition’, but proceeding at a variable rate and, at times, the geologist and churchman were one and the same person.

Certain conclusions can be made. Despite the date of 4004 BC being found in many English bibles a strict six-day creation was never the

dominant view and was the official position of no church in Europe or America (until the late twentieth century). The chaos–restitution interpretation promulgated first by Hugo Grotius, if not earlier, and then in the *Theories of the Earth*, in tandem with the understanding that the Bible was accommodated to the ‘rude and unlearned’, in fact opened the door for the churches’ acceptance of geological time. That door was first opened wide by Buffon, then gently opened by de Luc for Queen Charlotte and the High Church divines and, finally, with protestations of biblical literalism, by the evangelicals Chalmers and Sumner. Christians of whatever theological persuasion seemed happy in their method of ‘stretching the Bible like an elastic band’ (an expression used by Adam Sedgwick to criticise Hugh Miller’s biblical exegesis in a letter to Francis Close [27 March 1857], cited Roberts 2002, p. 160) without any major worries of being considered unorthodox. It did not matter whether they were High Church ‘Church and King’ Anglicans, evangelicals of all shapes and sizes, Roman Catholics or radical dissenters associated with the Lunar Society and republicanism.

To most Trinitarians and Unitarians the vast aeons of geological time were to be welcomed, even if tinged with a little caution. That caution was greater in Britain than in Europe, largely due to the biblicist influence of the evangelical revival. It is remarkable that so little caution was shown in the reactionary 1790s by the British Church to the findings of geology which are so often perceived as a result of what they opposed—the Enlightenment and its bitter fruit the French Revolution.

Versions of this paper were presented at the *Science and Belief Conference* at Durham in September 2002 and at a history seminar at the University of Lancaster in 2003. I thank J. G. C. M. Fuller and M. Rudwick for useful comments on an earlier draft. Rudwick’s *Bursting the Limits of Time* came out too late to be used extensively and provides the geological background I omitted due to lack of space. I have benefited from the encouragement of members of HOGG (History of Geology Group) and *Christians in Science* over the years as I have trodden a path which is neither geological nor theological.

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