

# **Doomsday Cults and Recent Quantavolutions – A Complex Relationship**

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## **Abstract**

The details of doomsday scenarios accepted by members and followers of cults may rightly be considered irrational, since they are generally derived from claimed revelations or inspired readings of ancient sources (including the scriptures), without proper regard to objective evidence or logic. Nevertheless, there is nothing irrational about the belief that, as a general principle, life on Earth may be devastated or even annihilated by a catastrophic event at some unspecified time in the future. We are now aware that catastrophic events, some large and some small, have occurred in the past, and we are aware of natural forces that could threaten the Earth on some future occasion, even though we cannot currently predict any of the details. Archaeology has shown that there were occasions during the first three millennia BC when rapid cultural changes took place at times of environmental stress (i.e. when quantavolutions occurred), and it is reasonable to suppose that this is reflected in the beliefs of ancient societies that divine forces could bring their own age to an end in similar fashion. In the case of the early Christians, a belief that Christ would return and carry out the “last judgement”, beginning the countdown to the end of the world, was present from the start. This event was expected sooner rather than later, and it seems likely that, as the centuries passed, it might have faded from general consciousness, had it not been for the periodic occurrence of catastrophes, which were taken as indications of God’s displeasure, or auguries of some terrible event to come. Sometimes, such catastrophes formed part of a more general quantavolutionary episode, which would have made a particularly strong impression on the people of the time, reviving thoughts of the last judgement and the end of the world. Even in later times, when it had become generally accepted that catastrophic events had natural causes, the recurrence of quantavolutionary episodes, together with the development of knowledge about the range of natural forces that could threaten life on Earth, continued to arouse thoughts about the end of the world. Cults, including some religious groups, made predictions about the date of the terminal catastrophe on the basis of dubious evidence and logic, and many of these have already been proved wrong. Nevertheless, the general principle remains, that the forces which linked to produce the quantavolutionary episodes of the past five thousand years could produce further ones in the future, and there are other known forces which could give rise to even greater catastrophic events. However, the timing of all of this is completely uncertain.

## **Introduction**

Early in 2011, people living in the western world were becoming increasingly aware, generally with more amusement than concern, of a claim by an elderly American, Harold Camping, that the world, or at least the world as we know it, was about to come to an end. On 21 May 2011, 200 million souls, about 3% of the world’s population, would be “saved” and “raptured” to Heaven, whilst the rest of us would be subjected to earthquakes on a global

scale. These, and other tribulations, would continue until the Earth was physically destroyed 5 months later, on 21 October (Camping, 2005, 2008). Camping, a former civil engineer, proclaimed that all this followed inevitably from statements made in the Bible. However, few of these mentioned timescales in anything resembling an unequivocal way. Camping's methodology was to link his own unique interpretations of biblical passages to the cycle of Jewish feast days in the Hebrew calendar, lunar cycles and the Gregorian calendar tropical year. He liked quoting stirring passages from the books of Old Testament prophets such as Daniel, Ezekiel and Jeremiah, and from the New Testament book of *Revelation*, all full of references to battles between good and evil, upheavals of the Earth, and the wicked being brought to judgment. Many biblical scholars have expressed the view that these prophecies referred to events close to the times in which they were written, rather than the distant future. Nevertheless, Camping was convinced about the accuracy of the dates he had come up with, seeing confirmation in the fact that 21 May 2011 was exactly 722,500 days after 1 April AD 33, which he believed to be the date of the crucifixion, and 722,500 is the sum obtained if three supposedly holy numbers, 5, 10 and 17, are multiplied together twice. Also, 21 May 2011 was exactly 7,000 years after the date he had calculated for Noah's Flood.

It would be easy to picture Camping as a figure of fun, a lone crank, but in fact he had a huge following in the USA and elsewhere, many of his followers giving up their jobs and donating large sums of money to his organisation, called Family Radio, to help publicise his ideas. As the crucial time approached, Family Radio, set up during the 1950s, had assets of 120 million dollars, owned and operated 66 radio stations in the USA alone, and was making programmes in 48 languages. It also erected 2,000 billboards across the USA, bearing the slogan, "Blow the trumpet, warn the people" (a quotation from Ezekiel chapter 33 verse 3), together with the message, "Judgement day, May 21 2011. The Bible guarantees it." (Adams, 2011)

When nothing out of the ordinary happened on May 21<sup>st</sup>, Camping disappeared from public view for a few hours, but then re-emerged to say that the conclusions he had reached from the scriptures were correct, except in one detail. Judgement had indeed taken place, but it had been a spiritual event, not a physical one. The key point was that the world would still be destroyed on 21 October 2011. However, regardless of his misunderstanding about what was going to happen on 21<sup>st</sup> May, Camping had previously predicted that the world would come to an end in 1994, and then revised his prediction when nothing happened at the specified time, so the general scepticism about our impending doom was understandable (Pilkington, 2011). As for Camping himself, he suffered a stroke on 9 June 2011, causing the removal of his programme from the Family Radio schedules (Tenety, 2011).

Camping and his followers, however, are not the only ones envisaging the rapid approach of doomsday. Assuming that we pass unscathed through the remainder of 2011, we then enter the year which, according to a number of recent books and internet postings, was identified by the ancient Maya of Mexico and Guatemala as the one in which the world would come to an end. As is known from the inscriptions they left behind, the Maya, who reached their zenith between AD 250 and 900, had a calendar involving several components, together making up a "long count": 360 days constituted a *tun*, 20 *tuns* were a *katun*, and 20 *katuns* made up a *baktun*, 13 of these *baktuns* being referred to in some Mayan inscriptions as a

significant period. It has been established that the Mayan calendar began at a date corresponding to 11 August, 3114 BC (Grube, 2000, p. 138; Phillips, 2004, pp. 122-123; Heley, 2009, pp. 24-33; Aveni, 2009, p. 46). That was well before the start of the Mayan civilisation and, although it is thought possible that the Mayan calendar was derived from that of the Olmecs, the earliest known rulers of Mesoamerica, famous for their immense and mysterious sculptured heads, there are no traces of anything resembling an Olmec civilisation before around 2,500 BC, but it is not unusual for ancient civilisations to have tried to give the impression they were older than was actually the case. Regardless of its origin, the “long count” of this calendar was well-established during the course of the Mayan civilisation (Grube, 2000, pp. 87-141; Douglas, 2009, pp. 28-86).

In 1975, Frank Waters, who was part-Cheyenne, and a student of native American culture, suggested in his 1975 book, *Mexico Mystique*, that the end of the 13<sup>th</sup> *baktun*, and hence apparently of the Mayan “long count”, corresponded to 24 December 2011. Also, Mesoamerican tradition had identified five cycles of world ages, each ending with a catastrophe, of which the age terminating at the end of the long count must have been the fifth (Waters, 1975; Nizalowski, 2000; Krupp, 2009). Waters took the date of 24 December 2011 from the first edition of Michael Coe’s book, *The Maya* (Coe, 1966), whereas it subsequently became generally accepted that the correct date is 21 December 2012 (Morley and Brainerd, 1983). Also, it should be noted that the notion of five world ages actually came from the mythology of the Aztecs, who became the dominant power in Mesoamerica after the collapse of the Mayan civilisation. According to the Aztecs, the first world age, ruled by giants, came to an end when the god Quetzalcóatl caused the giants to be eaten by jaguars. The second age, ruled by Quetzalcóatl, was destroyed by ferocious winds. The third age, ruled by the rain god, Tláloc, was overcome by fire, and the fourth age, ruled by Tláloc’s sister, Chalchiútlucue, was destroyed by catastrophic floods. Then came the current age (the fifth), whose main deity was the sun god, Tonatiuh. It was predicted that this age would eventually end in cataclysmic earthquakes (Jones and Molyneux, 2002, pp. 110-111; Phillips, 2004, pp. 156-159).

The Maya had similar but not identical myths to those of the Aztecs, and there were also regional variations. The writings of the Maya of the Yucatán peninsula of Mexico, including the sacred book *Chilam Balam*, refer to four world ages. The first, peopled by a race of dwarfs, who were believed to have built the ruined cities of the region, was destroyed by a flood, as was the second, peopled by a race termed “the offenders”. The third age, which was the present one to the Mayan writers, would also end in a flood. A fourth age would then arise, and would meet the same fate as the others (Jones and Molyneux, 2002, p. 112).

The *Popul Vuh*, the sacred book of the Maya of Guatemala, refers to just three world ages. The first was created by the gods Tepeu (or Huracán) and Gucumatz, who peopled it with animals and then tried to create human beings from mud. However, these crumbled to dust as the mud dried, so were allowed to be washed away by the waters of a flood, terminating the age. The gods then created men from wood and women from rushes, but this new race of humans lacked the intelligence to communicate with the gods and became wicked. Hence the storm god Huracán stirred up a great flood to bring the second age to an end, and monsters

were set loose to devour the humans who had escaped the flood, although some survived to become monkeys. To people the new age, humans with greater intelligence were then created from maize dough (Grube, 2000, p. 286; Jones and Molyneux, 2002, p. 112; Phillips, 2004, pp. 146-153).

A few months after the publication of Waters' book in 1975, American brothers, Dennis and Terence McKenna, in *The Invisible Landscape*, saw significance in the fact that the winter solstice Sun was currently only about 3° from the galactic centre, as viewed from the Earth, and was moving even closer towards eclipsing it (although, since, as they pointed out, the galactic centre was 2° away from the Sun's path through the sky, such an eclipse could never actually take place) (McKenna and McKenna, 1975). Two decades later, in the second edition of the book, they suggested that the positions in the sky of the winter solstice Sun and the galactic centre would be particularly close on 21 December 2012, the date now generally accepted as that of the end of the 13<sup>th</sup> Mayan *baktun* (McKenna and McKenna, 1994).

Taking the Maya and Aztec myths as evidence of knowledge of previous major catastrophes and of observations pointing to future ones, a number of subsequent authors argued that the Maya, a sophisticated people with advanced astronomical knowledge, had reason to believe that the world would come to an end, amidst convulsions of the Earth's crust, on 21 December 2012. A feature film on this theme, directed by Roland Emmerich and starring John Cusack, was released in 2009. Posters for the film, which was entitled simply *2012*, were headed by the prominent statement, "We were warned".

Let us now leave the specific topic of the 2012 doomsday scenario for a while, to discuss more general issues. It seems quite likely that the mind-set of people in ancient civilisations was influenced, at least to a certain extent, by personal experience or transmitted accounts of large-scale catastrophes of terrestrial or cosmic origin. That is suggested by the Aztec myth of the five world ages, mentioned above, and also by many aspects of other myths from around the world. Consistent with that, archaeology indicates that the Old Kingdom of Egypt, together with well-established cultures to the north-east, making up what is termed the "cradle of civilisation", came to a rapid end amidst political and environmental turmoil around 2300 BC, marking the end of the Early Bronze Age in the region (Peiser, Palmer and Bailey, 1998; James and Thorpe, 1999; Fagan, 2004, pp. 139-145; Mandelkehr, 2006). One of the consequences of the world-wide climate changes which took place at this time may have been the eventual establishment of conditions in Mesoamerica which facilitated the development of the Olmec civilisation. There were also similar widespread cultural and environmental disruptions around a thousand years later, at the end of the Late Bronze Age, when the Mycenaean civilisation of Greece, the Hittite Empire of Anatolia and the New Kingdom of Egypt all came to an end (Schoch, 1999; Robins, 2001; Fagan, 2004, pp. 173-188; Van der Mieroop, 2007). At other times, too, there is evidence, albeit on a more regional scale, of devastation caused by phenomena such as great floods, droughts, earthquakes, lightning strikes, falls of meteorites and volcanic eruptions, and it is clear from the writings of the ancients that such tribulations were generally thought to be associated with the actions of deities. That certainly applied to the God of Israel and Judah, who, as described in the Old Testament, punished human beings for their wickedness by causing the great flood in the

time of Noah (*Genesis* 6-8), the destruction of the cities of Sodom and Gomorrah in the time of Abraham and Lot (*Genesis* 18-19), and the plagues of Egypt in the time of Moses (*Exodus* 5-12). This tradition was, of course, the one out of which Christianity grew.

### **Early Christianity and expectations of the second coming of Christ**

From the earliest days of the Christian religion, the circumstances and timing of the end of the world became a consideration. According to the 24<sup>th</sup> and 25<sup>th</sup> chapters of the gospel of Matthew, not long after Jesus had made it clear to his disciples that he was soon to be arrested and crucified, but would later return to take control of his kingdom, a private discussion took place on the mount of Olives. During this, the disciples sought clarification about the second coming, asking Jesus, “Tell us, when shall these things be?, and what shall be the sign of thy coming, and of the end of the world?” Jesus responded, “Take heed that no man deceive you. For many shall come in my name, saying I am Christ, and shall deceive many. And ye shall hear of wars and rumours of wars...For nation shall rise against nation, and kingdom against kingdom: and there shall be famines, and pestilences, and earthquakes, in divers places. All of these are the beginnings of sorrows...When ye therefore see the abomination of desolation, spoken of by Daniel the prophet, stand in the holy place...Immediately after the tribulation of those days shall the sun be darkened, and the moon shall not give her light, and the stars shall fall from heaven, and the powers of the heavens shall be shaken; And then shall appear the sign of the Son of man in heaven: and then shall all the tribes of the earth mourn, and they shall see the Son of man coming in the clouds with power and great glory. And he shall send his angels with a great sound of a trumpet, and they shall gather together his elect from the four winds, from one end of heaven to the other...Verily I say to you, This generation shall not pass, till all these things be fulfilled...But of that day and hour knoweth no man, no, not the angels of heaven, but my Father only...Therefore be ye also ready: for in such an hour as ye think not, the Son of man cometh...When the Son of man shall come in his glory, and all the holy angels with him, then shall he sit upon the throne of his glory: And before him shall be gathered all nations: and he shall separate them one from another, as a shepherd divideth his sheep from the goats: And he shall set the sheep on his right hand, but the goats on the left. Then shall the king say unto them on his right hand, Come, ye blessed of my Father, inherit the kingdom prepared for you from the foundation of the world...Then shall he say also unto them on the left hand, Depart from me, ye cursed, into everlasting fire, prepared for the devil and his angels.” (All biblical quotations in this paper are taken from the King James version of 1611.)

There are various indications that the earliest Christians believed that the second coming of Christ would occur during their lifetime, but that obviously failed to happen. Their successors had to re-appraise the situation, but they still generally supposed that the end of the world would not be long delayed. A popular belief, based on the statement in *2 Peter* chapter 3 verse 8 (perhaps derived from *Psalms* 90 verse 4), that “one day is with the Lord as a thousand years, and a thousand years as one day”, was that, since the *Genesis* account said that God had created the world in six days, it would, in the form that we knew it, be brought to an end 6,000 years after its creation (Declercq, 2000, p. 25). That view was stated, for example, by Hippolytus of Rome who wrote, early in the third century AD, “And 6.000 years needs be

accomplished, in order that the Sabbath may come, the rest, the holy day, on which God rested from all his works. For the Sabbath is the type and emblem of the future kingdom of the saints, when they shall reign with Christ, when he comes from heaven, as John says in his Apocalypse [i.e. *Revelation*], for a day with the Lord is as a thousand years. Since, then, in 6 days God made all living things, it follows that 6,000 years must be fulfilled” (Hippolytus, 3<sup>rd</sup> century).

Within that context, *1 John* chapter 2 verse 18, which states, “Little children, it is the last time; and as ye have heard that antichrist shall come, even now there are many antichrists; whereby we know that it is the last time”, was taken to imply that Jesus had been born at the beginning of the world’s final hour. Relating the 6,000 years of the world to the 12 hours of a day, then if the birth of Jesus had taken place at the start of the final hour, the 11<sup>th</sup>, it would have been 5,500 years after the creation of the world and 500 years before its end (Declercq, 2000, pp. 25-26). That was believed by many early Christians.

The chronicle of Hippolytus of Rome placed the birth of Christ in *annus mundi*, i.e. “year of the world”, 5500, as did the chronicle of his contemporary, Julius Africanus (Mosshammer, 2008, pp. 27-29). There was no historical evidence to provide a direct linkage between the birth of Christ and the timescale of the Roman empire, but in the first verse of chapter 3 of Luke’s gospel, it was stated that Jesus began his ministry when he was aged about 30, in the 15<sup>th</sup> year of the reign of emperor Tiberius Caesar. On that basis, it became accepted by the early Christians that Jesus had been born in either the 41<sup>st</sup> or 42<sup>nd</sup> year of emperor Augustus, the predecessor of Tiberius, so, to within a year, *annus mundi* 5500 could be linked to the timescale of the Roman empire (Declercq, 2000, pp. 10-13). So, for example, maintaining that linkage, Africanus ended his chronicle in the 3<sup>rd</sup> year of emperor Elagabalus and *annus mundi* 5723, which, in the view of most Christians at the time, would have been just 277 years before the Parousia, the second coming of Christ (Mosshammer, 2008, p. 387).

To many of these Christians, the second coming of Christ was more or less synonymous with the end of the world. However to others, including prominent scholars such as Tertullian, the situation was somewhat different. These, subsequently referred to as millennialists, envisaged, on the basis of the book of *Revelation*, the second coming of Christ, in circumstances which would undoubtedly have been terrifying to those alive at the time, as only the first stage in a long process which would eventually lead to the end of the world, a thousand years into the future.

The author of *Revelation*, St. John of Patmos, indicated, on the basis of a vision, that the release of the four horsemen of the Apocalypse, bringing about conquest, war, famine and death, followed by earthquakes, the dimming of the Sun and Moon, and stars falling to Earth, would be a prelude to the second coming of Christ, the Lamb of God, who would take control of the situation and carry out the last judgement, redeeming 144,000 people. Of particular significance to the millennialists, he then continued, at the beginning of chapter 20, “And I saw an angel come down from Heaven, having the key of the bottomless pit and a great chain in his hand. And he laid hold of the dragon, that old serpent, which is the Devil, and Satan, and bound him a thousand years, And cast him into the bottomless pit, and shut him up, and

set a seal upon him, that he should deceive the nations no more, till the thousand years should be fulfilled; and after that he must be loosed a little season.” Thus, as interpreted by the millennialists, Satan would be imprisoned for a thousand years after the second coming of Christ, and then released. According to *Revelation*, a final battle would then take place between the forces of good and evil at Armageddon, with good triumphing, and Satan being cast into a lake of fire and brimstone. The vision of the aftermath was conveyed by the writer in the first three verses of chapter 20: “And I saw a new heaven and a new earth, for the first heaven and the first earth were passed away, and there was no more sea. And I, John, saw the holy city, new Jerusalem, coming down from God out of heaven...And I heard a great voice out of heaven saying. Behold the tabernacle of God is with men, and he shall dwell with them, and they shall be his people, and God himself shall be with them and be their God.” In the millennialist scenario, therefore, Christ would rule on Earth for a thousand years following his second coming, after which there would be a brief final conflict, before the end of the Earth which had existed up to that time.

However, the millennialist view failed to become the official doctrine of the Christian church (Declercq, 2000, p. 39). The Nicene Creed, agreed at the Council of Nicaea early in the fourth century, included the sentence, “He will come again in glory to judge the living and the dead, and his kingdom will have no end”. Furthermore, the widely-held view that the second coming of Christ would take place in the 6,000<sup>th</sup> year of the world also failed to achieve official status, since it was difficult to reconcile it with the statement in the gospel of Matthew that the date of the second coming was known only to God. Around the beginning of the fifth century, St. Augustine of Hippo attempted to break the perceived linkage between the six days of creation and six 1,000-year historical periods by introducing into Christianity the concept of six world-ages, the birth of Christ coming at the start of the sixth and last of these. He avoided giving a precise time-length to any of them, saying instead that the first two consisted of 10 generations each, with the next three all consisting of 14 generations. Augustine then went on to stress that the current age, the sixth, was not limited by a fixed number of generations. He also argued that the Sabbath rest of the righteous, referred to by Hippolytus of Rome, took place in Heaven, and overlapped with the six world-ages on Earth, rather than constituting a subsequent seventh age on Earth. Augustine’s concept became popular, and, following his example, a number of prominent scholars went on to maintain that the sixth age was of indeterminate length (Declercq, 2000, pp. 39-41). Nevertheless, many “ordinary” Christians continued to believe that Christ would return, amidst great turmoil, in *annus mundi* 6000.

Concern about this seems to have been greater in western Europe than in regions to the east. In Constantinople, where the tradition of linking the birth of Christ to *annus mundi* 5500 had been maintained, year 6000 arrived during the reign of emperor Anastasius around the beginning of the sixth century AD, without any apparent excitement. A few years later, the chronicler, John Malalas, simply noted that “the sixth millennium has been passed” (Jeffreys *et al*, 1986, p. 247).

In the west, by this time, the scheme devised by Eusebius of Caesarea had become the most popular *annus mundi* dating system. This determined the time interval from Adam to the birth

of Christ using information from the Septuagint Greek translation of the Hebrew bible, and on that basis dated the birth of Christ in the 42<sup>nd</sup> year of Augustus to the 5199<sup>th</sup> year since Creation, i.e. *annus mundi* 5199, differing by three hundred years from the *annus mundi* 5500 date which had previously been generally accepted. It seems likely that one of the reasons why this new system gained favour in the west was that, to the many who feared the arrival of *annus mundi* 6000, associating it with the second coming of Christ and the last judgement, it placed that dreaded date three hundred years further away into the future (Declercq, 2000, pp. 42-43; Wallis, 2004, pp. 354-360).

### **Signs of God's displeasure?**

However, in both east and west, any comfort the people may have received from being told there was no reason to think that the second coming of Christ was imminent was tempered by the inescapable fact that life was harsh and insecure. As it must have seemed to the superstitious, i.e. most of the population, God was constantly demonstrating his powers by actions causing great terror and destruction, regardless of whether the intention was to punish the wicked or to test the faith of the remainder. Records of Chinese astronomers show an enhanced frequency of fireballs plunging through the atmosphere for three centuries centred on AD 500 (Clube, 1998).

In the year corresponding to AD 365, there was a major earthquake and subsequent tsunami in the region of the eastern Mediterranean, as recorded in this classic account by the pagan Roman historian, Ammianus Marcellinus: "On the 21<sup>st</sup> July in the first consulship of Valentinian with his brother, horrible phenomena suddenly spread through the entire extent of the world, such as are related to us neither in fable nor in truthful history. For a little after daybreak, preceded by heavy and repeated thunder and lightning, the whole of the firm and solid earth was shaken and trembled, the sea with its rolling waves was driven back and withdrew from the land, so that in the abyss of the deep thus revealed, men saw many kinds of sea-creatures stuck fast in the slime; and vast mountains and deep valleys, which Nature, the creator, had hidden in the unplumbed depths, then, as one might well believe, first saw the beams of the sun. Hence, many ships were stranded as if on dry land, and since many men roamed about without fear in the little that remained of the waters, to gather fish and similar things with their hands, the roaring sea, resenting as it were this forced retreat, rose in its turn; and over the boiling shoals it dashed mightily upon islands and broad stretches of the mainland, and levelled innumerable buildings in the cities and where else they were found, so that amid the mad discord of the elements the altered face of the earth revealed marvellous sights. For the great mass of waters, returning when it was least expected, killed many thousands of men by drowning; and by the swift recoil of the eddying tides, a number of ships, after the swelling of the wet element subsided, were seen to have foundered, and lifeless bodies of shipwrecked persons lay floating on their backs or on their faces. Other great ships, driven by the mad blasts, landed on the tops of buildings (as happened in Alexandria), and some were driven almost two miles inland, like a Laconian ship which I myself in passing that way saw near the town of Mothone, yawning apart through long decay." (Rolfe, 1939)



European chronicles and histories note further earthquakes, as well as terrifying celestial phenomena and outbreaks of plague and famine, over the next century, the period characterised by the fall of the western half of the Roman empire, following the formal division between Rome and Constantinople in AD 395. The reasons for the collapse of Rome's power are complex, and undoubtedly include poor leadership and internal strife, but environmental stresses leading to migrations of populations also played a part (Heather, 2006; Barker, 2006). In the middle of the 5<sup>th</sup> century, Huns migrated from Asia and seized land to the north and northwest of the Black Sea, displacing the tribes who lived there, with consequent effects on other tribes. Seeing the control of Rome over Gaul and Spain slipping, as successive western emperors attempted to fight off rival claimants to the throne, three German tribes, the Vandals, Alans and Suevi, perceived it would be to their advantage to migrate westward, and saw their opportunity when the Rhine froze over in AD 406, allowing them to cross it easily with their belongings. They settled in Spain around three years later. Meanwhile, the Visigoths had been driven south over the Danube by the Huns, which brought them into direct contact with the Romans. Under the command of Alaric I, they plundered the city of Rome and then, under Alaric's successor, they too headed for Spain, eventually pushing the Vandals across the Straits of Gibraltar into North Africa (Wolf, 1999, pp. 83-90; Murray, 1999, pp. 62-73, 77-84, 86-91). In northern Europe, the Franks crossed the Rhine and settled initially in what is now Belgium. Later, they began to expand their territory throughout most of Gaul (Thorpe, 1974, pp. 120-158).

Halfway through the fifth century, Attila led the army of the Huns on a venture into western Europe, but he was repulsed on the Catalaunian fields near Rheims by a confederation led by the Visigoth king, Theoderid I, and Aëtius, commander of what remained of Roman Gaul (Thorpe, 1974, pp. 114-118; Murray, 1999, pp. 73, 85, 91-92). Isidore of Seville wrote of this battle, "Many signs in the heavens and on earth preceded these events, prodigies signifying a particularly cruel war. Earthquakes occurred constantly, the moon was obscured in the east, and from the west an enormous comet appeared and shone for some time. In the north the sky reddened, having the appearance of blood or fire, permeated with bright lines shaped like golden spears. It is not surprising that the slaughter of so many men in battle should have been divinely heralded by such a display of signs". (Wolf, 1999, pp. 91-92)

The Huns retreated from Gaul but then, refreshed and reinforced, they advanced on Rome. Once again they were forced to retreat but, on this occasion, the outcome was determined not so much by force of arms as the fact that Attila's army became seriously weakened by hunger and disease as they passed through the famine-ridden plains of northern Italy. Three years later, the Vandals made a raid on Italy from their territories in North Africa, and sacked Rome. The western Roman empire lasted only another 21 years. The last emperor, Romulus Augustulus, was deposed in AD 476 by Odoacer, a supposed ally, and in AD 493, the Ostrogoth, Theodoric the Great, established himself as king of Italy (Murray, 1999, pp. 92-102; Jeffreys *et al*, 1986, pp. 195-213). To any western Europeans who had managed to survive throughout a substantial part of the fifth century, the world as they had known it had certainly come to an end.

In the eastern Roman empire, subsequently termed Byzantine, there had been more continuity. Furthermore, we have seen, by the time Malalas was writing his chronicle, initially in Antioch and later in Constantinople, mainly during the reign of emperor Justinian the Great, the transition from the 6<sup>th</sup> to the 7<sup>th</sup> millennium of the world appeared to have passed serenely. However, Justinian's armies became involved in conflicts with the Ostrogoths to the west, the Vandals to the south, Sassanid Persians to the east and groups of Turks and Slavs to the north. Also, Malalas wrote about other events that were clearly disturbing to his contemporaries. He reported that, in the year corresponding to AD 526, "Antioch suffered its fifth calamity from the wrath of God during the consulship of Olybrius. Great was the fear of God that occurred then in that those caught in the earth beneath the buildings were incinerated and sparks of fire appeared out of the air and burned anyone they struck like lightning. The surface of the earth boiled and foundations of buildings were struck by thunderbolts thrown up by the earthquakes and were burned to ashes by fire, so that even those who fled were met by flames. It was a tremendous and incredible marvel with fire belching out rain, rain falling from tremendous furnaces, flame dissolving into showers, and showers kindling like flames consumed even those in the earth who were crying out. As a result, Antioch became desolate, for nothing remained apart from some buildings beside the mountain (Jeffreys *et al*, 1986, p. 238)." The death toll was said to be 250,000. Reconstruction of the city began, but, two years later, history repeated itself. Malalas wrote, "It was at that time that Antioch suffered its sixth calamity from the wrath of God. The earthquake that occurred lasted for one hour and was accompanied by a horrible roaring sound, so the buildings that had been reconstructed after the former shocks collapsed, as did the walls and some of the churches...Up to 5,000 lives were lost in this earthquake" (Jeffreys *et al*, 1986, pp. 256-257).

After recording some of the events of the following two years, Malalas noted that "there appeared a tremendous great star in the western region, sending a white beam upwards: its surface emitted flashes of lightning. Some people called it Firebrand. It continued shining for 20 days, and there were droughts and murder during riots in every city and many other events full of ill omen". Soon afterwards "there were widespread earthquakes and much time was spent in prayer in each city" (Jeffreys *et al*, 1986, pp. 266-268). A year or two later, there "occurred a great shower of stars from dusk to dawn, so that everyone was astounded and said, 'We have never known anything like this to happen'." Soon after that, "an earthquake occurred in Byzantion [i.e. Constantinople] late in the evening, so that the whole city gathered in the place known as the Forum of Constantine, assembling for prayers, petitions and vigils", and this was followed by another earthquake in Antioch (Jeffreys *et al*, 1986, pp. 282-284). Malalas went on to report several more earthquakes in the region, some causing considerable damage, over the next 25 years (Jeffreys *et al*, 1986, pp. 289-295) but, in the meantime, he noted that, in the indiction year corresponding to AD 541/2, a great plague arose in Egypt and soon reached Constantinople (Jeffreys *et al*, 1986, p. 286). This was the pandemic subsequently known as the Plague of Justinian, which, in the first of several waves, killed an estimated 40% of the population of the city and perhaps a third of the total population of the Byzantine empire, leaving it in a seriously weakened state (Mango, 2002;

Angold, 2002; Castleden, 2007, pp.86-87). It also caused devastation in many other parts of the inhabited world.

### **The influence of Bede**

Around the world, as has been well documented, there was a general environmental downturn between AD 536 and 545, linked in chronicles and histories of the time to unusual celestial phenomena and earthquakes (Baillie, 1999; Keys, 1999; McCafferty and Baillie, 2005). In contrast, the 7<sup>th</sup> and 8<sup>th</sup> centuries seem to have been relatively mild, with scant mention in works written during this period of any strange occurrences in the physical environment. Amongst these works were those of the English monk, the venerable Bede, who was active during the first half of the 8<sup>th</sup> century, and showed a deep interest in a variety of issues.

By the time of Bede, *annus mundi* 6000 in the system of Eusebius was now less than a hundred years away. Bede himself maintained the official view of the church that the date of the second coming of Christ was known only to God, and could not be predicted, but he seems to have been aware that many were becoming obsessed with fears of its impending arrival, and the terrifying consequences. However, he could see a legitimate way of easing the tension. The Latin Vulgate Old Testament, translated from the Hebrew by St. Jerome, had avoided some of the errors made in the Septuagint translation, which had extended the time-span between Adam and the birth of Christ. Using the Vulgate translation, Bede calculated that the birth of Christ had been in *annus mundi* 3952, and so he was able to assure his contemporaries that *annus mundi* 6000 was still more than a thousand years away (Declercq, 2000, pp. 43-44; Wallis, 2004, pp. 353-362).

Many Jews took the same line as the early Christians in linking each of the days of Creation to 1,000 years of the world, but with significant differences. In their view, the Messiah, a human, not a divine figure, would appear before the 6,000<sup>th</sup> year of the world, to lead his people into the next millennium. This, as indicated in *Isaiah* chapter 11, would be an era of peace and religious devotion, when the harsh, confrontational world of former times would no longer exist. However, *annus mundi* 6000 in the Hebrew calendar was even further into the future, by a margin of about 200 years, than it was in the system of Bede. In fact, it is still 228 years ahead of us (Richards, 1998; Mosshammer, 2008, pp. 29, 87-88).

In the Christian world of western Europe, Bede went on to divert attention away from *annus mundi* dating systems by popularising the general use of the AD, i.e. *anno Domini*, system we use today, dating events from the supposed year of the birth of Christ. This system had been introduced in AD 525 by Dionysius Exiguus, a Scythian monk living in Rome, but, until Bede used it to date historical events in his *Ecclesiastical History of the English People*, completed in AD 731, its use had been restricted almost entirely to dating the annual entries in tables saying when Easter should be celebrated. Dionysius never explained the basis of his dating system, but he linked AD 525 to the 241<sup>st</sup> year since the accession of emperor Diocletian, thus associating AD 1, the year of the birth of Christ, with the 44<sup>th</sup> regnal year of Augustus, whereas Eusebius and others had placed it two years earlier. Bede agreed with Eusebius that Christ was born in the 42<sup>nd</sup> year of Augustus, but, presumably because the

Dionysian system had become well-established as an integral part of the Church's Easter tables, he seems to have been content to broaden its use without modifying the details (Blackburn and Holford-Strevens, 1999; Declercq, 2000, pp. 97-188; Holford-Strevens, 2005).

Although Bede's new *annus mundi* system, used throughout the world-chronicle he wrote in 722, may have appeared to have pushed fears relating to the second coming of Christ forward over a thousand years into the future, another detail of the same work, coupled with his popularisation of the AD system of Dionysius Exiguus, played a part in causing those same fears to surface again two centuries after his lifetime. Bede, following the example of another well-known chronicler, Isidore of Seville, in accepting the system of St. Augustine, identified the start of the current world-age with the birth of Christ. Thus, even though both Bede and Isidore, like Augustine, wrote that the length of this world-age, the sixth, could not be predicted, many Christians in western Europe during the second half of the 10<sup>th</sup> century, disregarding official church doctrine, believed that it would last exactly 1,000 years, and expected the second coming of Christ, or even the actual end of the world, to arrive in AD 1000 (Wallis, 2004, pp. 356-363; Holland, 2008).

### **The approach to AD 1000**

Events after the death of Bede contributed to this situation. Perhaps the first indication comes in the chronicle of Theophanes the Confessor, written in Constantinople early in the 9<sup>th</sup> century. In his entry for the Byzantine year corresponding to AD 763/4, Theophanes wrote, "In the same year it was bitterly cold after the beginning of October, not only in our land but even more so to the east, west and north. Because of the cold, the north shore of the Black Sea froze to a depth of thirty cubits a hundred miles out...Since the ice and snow kept on falling, its depth increased another 20 cubits, so that the sea became dry land. It was travelled by wild men and tame beasts from Khazaria, Bulgaria, and the lands of other adjacent people. By divine command, during February of the same 2<sup>nd</sup> indiction, the ice divided into a great number of mountainous chunks. The force of the wind brought them down...through the Bosphorus to the city, and all the way to Propontis, Abydos and the islands, filling every shore. We ourselves were an eyewitness and, with 30 companions, went out onto one of them and played on it. The icebergs had many dead animals, both wild and domestic, on them. Anyone who wanted to could travel unhindered on dry land from Sophianai to the city and from Chrysopolis to St. Mamas or Galata. One of these icebergs was dashed against the harbour of the acropolis, and shattered it. Another mammoth one smashed against the wall and badly shook it, so that the houses inside trembled along with it. It broke into three pieces, which girded the city...and was taller than the walls. All the city's men, women and children could not stop staring at the icebergs, then went back home lamenting and in tears, at a loss as to what to say about this phenomenon. In March of the same year, so many stars were seen falling from the sky, so that everyone who saw them suspected that this was the end of the age. There was also a bad drought, and even springs dried up." (Turtledove, 1982)

It seems that these early indications of another environmental downturn were less apparent in western Europe, for Frankish chronicles of the time give no indication of one. In contrast,

evidence of a widespread environmental crisis in the 9<sup>th</sup> century is strong. The Nile froze over in AD 829 (Fagan, 2004, p. 207), and it was recorded that merchants were able to take their wares to Venice by horse-and-cart across the frozen Adriatic in the winter of AD 859/60 (Reuter, 1992), with Swedish tree-ring data indicating that AD 860 was a particularly cold year in a cold century (Briffa *et al*, 1990). Frankish chronicles present a consistently dismal picture of the fragmentation of the Carolingian empire during the course of the 9<sup>th</sup> century, in an environment where winters were often said to be exceedingly long and harsh and, conversely, where there were occasional extremely hot periods during the summers. There were also frequent mentions of terrifying celestial phenomena, earthquakes, floods, droughts, famine and pestilence, which have been well-documented (Palmer and Palmer, 2002; Palmer, 2003, pp. 352-360; McCormick, Dutton and Mayowski, 2007). Here is just one typical example. In the entry for AD 870, the *Annals of Fulda* recorded, “At Mainz, the sky shone red like blood for many nights, and other portents were seen in the heavens...The lands around the same city were struck by two earthquakes...Several men gathering in the harvest in the district of Worms were found dead because of the heat of the Sun, which was fiercer than usual. Many were also drowned in the Rhine...There was also a serious cattle pestilence in many parts of Francia, which caused irretrievable loss to many” (Reuter, 1992). At the other side of the world at this time, the most arid period in Mesoamerica in 7,000 years occurred, which has been associated with the collapse of the Classic Maya civilisation, when the population was reduced by at least two thirds (Gill, 2000; Fagan, 2004, pp. 232-238).

In Europe, the first part of the 10<sup>th</sup> century appears to have been relatively free from environmental crises, but there was then another period of unusually severe winters, famine and pestilence around AD 940, possibly associated with the huge eruption of the Eldgjá volcanic canyon in southern Iceland in 934 (Stothers, 1998; Fei and Zhou, 2006). After that, average temperature generally moved upwards but, regardless of that, there is evidence that an increasing number of people were fearing the arrival of doomsday in AD 1000 (Holland, 2008). A Burgundian monk, Rodolfus Glaber, wrote a history of his time in which he told how men (including himself) believed they had seen auguries of such an event as the 10<sup>th</sup> century drew to a close. Glaber described a comet which appeared in AD 989 and remained visible for 3 months, saying that “it shone so brightly that its light seemed to fill the greater part of the sky”, adding that “this phenomenon in the sky never appears to men without being a sure sign of some mysterious and terrible event. And indeed, a fire soon consumed the church of St. Michael the Archangel, built on a promontory in the ocean which had always been the object of special veneration throughout the whole world”. However, that was only the start. Glaber went on to record that “in the seventh year from the millennium...almost all the cities of Italy and Gaul were devastated by violent conflagrations, and Rome itself largely razed by fire. As one, [the people] gave out a terrible scream and turned to rush to confess to the Prince of the Apostles”. Glaber then noted that many eminent men died around this time, and there had been an outbreak of heresy in Sicily, concluding, “All this accords with the prophecy of St. John, who said that the devil would be freed after a thousand years” (Lacey and Danziger, 1999, pp. 179-181; Castleden, 2007, pp. 88-90).

Glaber reported a sense of immense relief and forward-thinking when it became clear that nothing dreadful had occurred during the transition to a new millennium. He continued, “Just before the third year after the millennium, throughout the whole world, but especially in Italy and Gaul, men began to reconstruct churches, although for the most part the existing ones were properly built and not in the least unworthy, But it seemed as though each Christian community were aiming to surpass all others in the splendour of construction. It was as if the whole world were shaking itself free, shrugging off the burden of the past, and cladding itself everywhere in a white mantle of churches” (Lacey and Danziger, 1999, p. 182; Castleden, 2007, p. 91).

However, a nagging doubt remained. Glaber reported that some people were suggesting that the millennium to fear was not that of Christ’s birth, now safely passed, but that of his death and resurrection, still thirty years or so in the future. As the years unfolded, possible portents of an impending doomsday were again noted, but the dreaded day passed without incident, and Glaber was once again able to express the profound relief of the population, writing, “At the millennial anniversary of the Passion of the Lord, the clouds cleared in obedience to the Divine mercy and goodness and the smiling sky began to shine and flow gentle breezes” (Lacey and Danziger, 1999, pp. 183-184; Castleden, 2007, pp. 91-93).

### **The Black Death and its consequences**

Europe had now entered what is known as the Medieval Warm Period, which lasted for several centuries. Average temperatures then began to decline during the 13<sup>th</sup> century, and, on top of that, there was a significant and widespread environmental downturn in the 1330s. Temperatures eventually began to creep upwards, but remained generally low until the late 15<sup>th</sup> century (Officer and Page, 1993, pp. 97-98; Fagan, 2004, pp. 214, 248-249). According to the records of Chinese astronomers, this was a period of substantial fireball activity (Clube, 1998). In AD 1348, the plague now termed the Black Death began its ravages, killing around half the population within a few years (Byrne, 2004; Castleden, 2007, pp. 111-114). This caused a shortage of labour which effectively brought to an end the feudal system, and hence the world as most Europeans of the time knew it (Ziegler, 1997; Pollard, 2003). Although the plague eventually faded away, it (or something very similar) reappeared with force on seven occasions before AD 1500. According to reports, which have been well-documented (Baillie, 2006), the original onset of the Black Death was associated with the appearance of a comet, showers of fireballs, noxious gases in the atmosphere and the occurrence of earthquakes, including one of major proportions.

Of particular relevance to us here, some people responded to the succession of appearances of the plague by “living for the moment” (as depicted in Boccaccio’s *Decameron*), whereas many others turned to God, hoping to appease him by extreme sacrifices and self-tortures. When, despite that, the deadly plague continued to reappear, with the godly suffering just as much as the ungodly, the former could only conclude that either God was signalling that major reformations of political and religious practices were required, or that the end of the world, as described in the book of *Revelation*, was getting very close (Morris, 1893; Ziegler, 1997; Byrne, 2004, pp. 57-88). But when, precisely, would it occur?

The AD system used in western Europe was never adopted by the Byzantine rulers based in Constantinople, who, from the 10<sup>th</sup> century onwards, if not before, used an *annus mundi* dating system known as the Era of Byzantium. Because of the juxtaposition of the AD system in the west and the Era of Byzantium in the east over a period of many centuries, it is clear that year 1 in the latter system bridged the years corresponding to 5509 and 5508 BC. The Era of Byzantium system spread to Russia, and continued to be used there after the collapse of the Byzantine empire, following the fall of Constantinople to the Turks in AD 1453 (or Era of Byzantium year 6961) (Declercq, 2000, pp. 34-39; Mosshammer, 2008, pp.28-29, 311-316). It appears that the Black Death quickly spread from Europe to Russia, and outbreaks of the plague occurred somewhere in Russia every five or six years from 1350 to 1490 (Byrne, 2004, p. 62). That inevitably raised the issue of end-of-the-world scenarios. Millennialist movements are known to have arisen in Moscow in the period leading up to AD 1492, the 7000<sup>th</sup> year of the world according to the Era of Byzantium system (Ellis, 2008).

In western Europe, the prevalence of wars and plagues as the year AD 1500 approached, together with a growing resentment against what was seen as the widespread corruption of secular and ecclesiastical leaders, and a belief that God shared that resentment, led many people to believe that a major transformation of society was imminent, and groups sprung up to play an active role in trying to bring this about (Weinstein, 1958). Out of this situation came the Protestant Reformation of the 16<sup>th</sup> century (Hale, 1977; Oberman, 2006).

### **Millennialism and turmoil, 1500-2000**

After the Reformation, particularly in Protestant regions, millennialist scenarios began to diversify. Three different models of millennialism emerged, each having different views about the details of Christ's expected thousand year reign on Earth, immediately before the end of the world. (Note that some scholars restrict the term 'millennialism' to the specific meaning indicated above, and see it as a special case of the more general term 'millenarianism', which can refer to any significant change taking place at the end of a thousand year cycle, whereas others use the terminology in a much looser way. Here, to avoid confusion, 'millennialism' will only be used in its strictest sense.)

As well as the traditional millennialist view, now classified as pre-millennialist, which envisaged Christ's second coming as a physical act, inaugurating a thousand year reign on Earth prior to the events at the end of time, an alternative post-millennialist view arose, which saw Christ's thousand year reign on Earth before the final cataclysm as a spiritual one, involving the church as an intermediary (Landes, 2000). That was not entirely new, for it was consistent with the thoughts expressed by Glaber shortly before AD 1000 (Lacey and Danziger, 1999, p. 181; Castleden, 2007, p. 90). Other groups, known as amillennialists, believed that Christ's thousand year reign on Earth was a metaphorical rather than a literal concept. There were also those who, like Harold Camping more recently, derived Bible-based predictions about doomsday which included no reference to any thousand year period, literal or metaphorical, between the second coming and the end of the world.

The Roman Catholic Church has consistently maintained that the second coming will still take place, exactly as described in the New Testament, at a date which cannot be predicted, and has opposed all forms of millennialism. That remains its position, as stated in paragraphs 671-677 of the Catechism ([http://www.vatican.va/archive/ENG0015/\\_P1V.HTM](http://www.vatican.va/archive/ENG0015/_P1V.HTM)).

Those who hoped that the Protestant reformation would put an end to the manifestations of God's displeasure were soon disabused. Life continued to be harsh and brutal. Severe outbreaks of the plague continued to occur in Europe until the early 18<sup>th</sup> century. Average temperatures continued to be below what they had been during the Medieval Warm Period, with a so-called "Little Ice Age" occurring between AD 1550 and 1850 (Officer and Page, 1993, pp. 97-101; Fagan, 2000; Fagan, 2004, pp. 248-250). This was another stretch of time when Chinese astronomers recorded enhanced fireball activity (Clube, 1998), and the English Civil War, the French Revolution, the American War of Independence and the Napoleonic wars all took place during it. Although conditions fluctuated during the Little Ice Age, there were lengthy spells when rivers in northern Europe and the USA regularly froze over during the winter months. On top of that, in 1783, the slow but sustained release of acidic gases from the Laki fissure in Iceland resulted in a widespread toxic fog in the northern hemisphere, which dimmed the Sun and destroyed crops and livestock, leading to the deaths of 25% of the human population of Iceland and millions elsewhere (Francis, 1993, pp. 139-141, 368-370; Scarth, 1999, pp. 104-121; McGuire, 2005, pp. 46-47, 68-69).

Before then, the Lisbon earthquake and tsunami in 1755 had killed up to 100,000 people, and the death-toll in the 1908 earthquake at Messina in Sicily may have been twice as high (McGuire, 1999, pp. 156-159; Scarth, 2001, pp. 36-37, 84-85; Bryant, 2001, pp. 148-152). Dust thrown up into the atmosphere by the eruption of Tambora in the East Indies in 1815 caused a lowering of temperatures around the world the following year, which became known as the "year without a summer" (Francis, 1993, pp. 226-230, 379-382; McGuire, 1999, pp. 59-61; Scarth, 2001, p. 143). The explosive eruption of Mt. Pelée on Martinique in 1902 killed all but three of the 30,000 inhabitants of Saint-Pierre, the main town on the island (Francis, 1993, 83-92, 253-257; McGuire, 1999, pp. 29-30; Scarth, 1999, pp. 156-189). Six years later, an explosion of uncertain origin in the Tunguska region of Siberia in 1908 flattened an estimated 30 million trees in an area of 2,100 square kilometres, significantly larger than the total area of St. Petersburg, the capital of Russia at the time (Verma, 2005; Rubtsov, 2009).

After that, there were two World Wars during the 20<sup>th</sup> century, with a major influenza pandemic between them, and the Second World War was followed by continuing conflict in the Middle East, the location of Armageddon, i.e. the hill of Megiddo, where, according to the book of *Revelation*, a battle would take place at the end of time. Hence it is hardly surprising that there were some, including members of the New Age "Earth Changes" movement as well as millennialist groups, who feared that something cataclysmic would happen as AD 2000 approached (Lindsey, 1983; Robinson, 2004; Krupp, 2009). Those fears were exacerbated by the circulation of a translation of a quatrain by Nostradamus which read, "In the year 1999, and seven months, from the sky will come the Great King of Terror. He will bring back to life the great king of the Mongols. Before and after, War reigns happily"



(Cheetham, 1975). However, that did not follow naturally from the original, which read, “L’an mil neuf cens nonante neuf sept mois, Du ciel viendra un grand Roi deffraieur. Resusciter le grand Roi d’Angolmois. Avant que Mars regner par bon heur”. “King of Terror” was a blatant mistranslation (obtained by inserting a spurious apostrophe into “deffraieur”) for what should have been “host king”, i.e. supreme king of the area, and “from the sky” could equally well have been given as “from his region”. Furthermore, the phrase “king of the Mongols” made the assumption that the original, “Angolmois” was intended as an anagram of “Mongolois” (even though it would not have been an exact anagram), rather than, as would appear more likely, just a misspelling of “Angoumois”. Also, the reference to “War” was inferred from “Mars” in the original, Mars being the god of war, but Nostradamus could just as easily have been alluding to the appearance of Mars the planet, or to the month of March (Mars in French), and in any case the subject of the verb “will rule” was unclear. A more plausible translation of the quatrain is the following: “In the seventh month of the year 1999, the great host king will come from his region. He will restore to power the great king of Angoumois, who, after March, will reign happily once again”. Scholars analysing the work of Nostradamus have pointed out that, presumably to try to stay out of trouble, he often gave misspellings of names, and also dates far into the future, for predictions arising out of events of his own time, and this seems to be one such instance. King Francis I of France, who was also Count of Angoulême in the province of Angoumois, had been deposed and thrown into prison but, even before this quatrain of Nostradamus had been published, he had been restored to the throne as a result of an intervention by Charles V, the Holy Roman Emperor (Lemesurier, 2003).

We cannot be sure that this is what Nostradamus had in mind, but what is certain is that no Great God of Terror came out of the sky in 1999 to bring Genghis Khan and his Mongol hordes back to life. In fact, as the year 2000 approached, most of us were more concerned that there would be a widespread breakdown in computing systems than the possibility that the world was about to come to an end, but, as it happened, neither of those disasters occurred (Frater and Bean, 2008).

It was perhaps not surprising that some millennialist groups had predicted that the end of the world, or at least the first manifestation of a process leading to the end of the world, would occur around AD 2000 (Thiel, 2008/9; Lee-Warner, undated; Sides, undated). However, other millennialist groups had different views. Since there had not been a physical second coming of Christ to Earth in AD 1000, or at any other time, there was wide scope for alternative theories, often based on passages in the book of *Revelation*. So, for example, the 12<sup>th</sup> century Italian monk and theologian, Gioacchino da Fiore (known in the English-speaking world as Joachim of Fiore), built a new scenario, the “Three Ages philosophy”, from *Revelation* chapter 14 verses 11 and 12, “And I saw another angel fly in the midst of heaven, having the everlasting gospel to preach unto them that dwell on the earth, and to every nation, and kindred, and tongue, and people, saying with a loud voice, Fear God and give glory to him: for the hour of his judgement is come”. Da Fiore took that and subsequent verses, which included a vision of Christ sitting on a white cloud, to mean that, after the Age of the Father, or the Law (that of the Old Testament), and the Age of the Son (that of the New Testament),

there would be an Age of the Holy Spirit on Earth, following the start of Christ's rule in Heaven. On the basis of summations of generations and other biblical information, da Fiore suggested, in his major work, *The Harmony of the Old and New Testaments*, that the Age of the Holy Spirit would begin in AD 1260, with the implication that it would last 1000 years, up to the end of the world (Affleck, 1997; Kramer and Maza, 2002).

This "Three Ages Philosophy" was taken up and modified in later times. So, for example, the German Calvinist minister, Johann Heinrich Alsted, who lived during the transition from the 16<sup>th</sup> to the 17<sup>th</sup> centuries, believed that, after two "empty" millennia following the creation of the world, there would then be two millennia corresponding to the Age of Law and two millennia corresponding to the Age of Christ, after which would come the "Sabbath rest". On the basis of astronomical observations, he believed that the end of the Age of Christ, and of the world as he knew it, would occur before AD 1642 (Hotson, 2000).

### **Interpretations of Old Testament prophecies**

Some other Protestants used their own interpretations of passages in the books of the Old Testament prophets to formulate theories about the apocalyptic second coming of Christ. For William Miller, a Baptist minister in nineteenth century America, the key passage was *Daniel* chapter 8 verses 13 and 14: "And I heard one saint speaking, and another saint said unto that certain saint which spake, How long shall be the vision concerning the daily sacrifice, and the transgression of desolation, to give both the sanctuary and the host to be trodden under foot? And he said unto me, Unto two thousand and three hundred days; then shall the sanctuary be cleansed." Miller took the 2300 days to mean 2300 years, and be the period leading to the cleansing of the world by fire at the time of the second coming of Christ. His chosen starting point was in the period following the conquest of Babylonia by the Persians, when many Jews were in exile in Babylon, having been taken there after the destruction of Jerusalem by king Nebuchadnezzar. To be precise, Miller believed that the period of 2300 years began when a decree was issued by the Persian emperor Artaxerxes I in 457 BC, ordering the Jewish priest, Ezra, to lead a large party of exiles from Babylon to Jerusalem to take charge of civil and ecclesiastical activities there. Counting 2300 years forward from 457 BC, Miller deduced that the second coming would take place in the year 1844 (Miller, 1845; White, 1875; Rowe, 2008, p. 105). Miller developed a large following, known as Millerites, who urged him to tell them the exact date in 1844 when this would happen. He first suggested March 21<sup>st</sup>, then April 18<sup>th</sup>, and finally October 22<sup>nd</sup>, but all these dates passed without incident. The final one became known as "The Great Disappointment" (White, 1875; Shelley, 1999; Rowe, 2008, pp. 192-225). A prominent Millerite, Hiram Edson, wrote about the night of October 22<sup>nd</sup>: "Our fondest hopes and expectations were blasted, and such a spirit of weeping came over us as I have never experienced before...We wept, and wept, until the day dawned" (Knight, 1993). Many of Miller's followers then drifted away, but others retained their faith, trying to come to terms with the situation in a positive fashion (Bliss, 1853; Rowe, 2008, pp. 226-235). After Miller's death in 1849, some Millerites, including Hiram Edson, founded the Seventh Day Adventist Church, which now has 16 million members. These, as part of the doctrine of Investigative Judgement, are taught that Miller's prediction was

correct, but referred to an event in Heaven rather than on Earth (Morris, 1982; Frater and Bean, 2008).

Another passage in *Daniel* that has received much attention is chapter 9 verses 22 to 27, which reports what the angel Gabriel said to Daniel in a vision, during the exile of the Jews in Babylon. It tells of a highly-important seventy-week period in the history of Daniel's people, and of the city of Jerusalem: "Seventy weeks are determined upon thy people and upon thy holy city, to finish the transgression, and to make an end of sins, and to make reconciliation for iniquity, and to bring in everlasting righteousness, and to seal up the vision and prophecy, and to anoint the most Holy". These 70-weeks can be sub-divided into a 7-week period in which Jerusalem will be restored and re-built; then a 62-week period at the end of which the Messiah will be cut off, and the city and sanctuary destroyed; after which the prince (who might or might not be the same person as the Messiah, since that simply means anointed one, who could be a ruler or high priest, or both) will confirm the covenant with many for one week, but "in the midst of the week he shall cause the sacrifice and the oblation to cease, and for the overspreading of the abominations he shall make it desolate". Most scholars, Jews and Christians alike, who have believed this passage to represent a genuine prophecy, took each of the "weeks" to have consisted not of 7 days but of 7 years (although not necessarily ones identical in length to our existing years), and the first seven "weeks" to have represented the period of the re-building of Jerusalem and its temple after the conquest of the Babylonians by the Persians. To Jewish scholars, the remainder of the prophecy could cover the period to what Christians term the 2<sup>nd</sup> century BC, the "prince" being the Seleucid king Antiochus IV Epiphanes (who intervened in a civil war between traditionalist and Hellenised Jews, conquering Jerusalem) (Crompton, 1996; Seow, 2003), or alternatively to a century later, the time of Alexander Yannai, who was the last of the important Hasmonean rulers of Judaea and Syria, and also a high priest (Shishler, 2007). Early Christians such as Tertullian adopted a slightly longer timescale, believing that the cutting-off of the Messiah was a prediction of the crucifixion of Jesus (Tertullian, c. 200). An indication in the Hebrew bible, strenuously pointed out in recent years by the "Jews for Judaism" organisation, that the 7-week period ended before the 62-year period began, was not apparent in translations, so Christians have often assumed that the two periods overlapped. So, Tertullian, for example, believed that the prophecy continued for 7 or 8 "weeks" after the time of Jesus, and argued that its end-point was the fall of Jerusalem (in AD 70) to the Romans under Titus, the future emperor (and hence an appropriate "prince").

Some present-day believers in an imminent second coming of Christ have attempted to extend the "seventy-weeks" of Daniel into the 21<sup>st</sup> century, claiming that there is a gap of an unspecified period of time between the events of the first 69 weeks and those of the final week, which they believe to be the same as those mentioned in the book of *Revelation*. This view, termed a "dispensational" one, was first popularised in the nineteenth century by an Anglo-Irish evangelist, John Nelson Darby (Vlach, 2011). Amongst the bodies adopting it during the twentieth century was the Worldwide Church of God (WCG), founded in California in 1968 by Herbert W. Armstrong, as a development of a broadcasting ministry he had operated since 1934 (Tucker, 1996; Malm, undated; Langford *et al*, undated).

Armstrong's enthusiasm for biblical end-time prophecies attracted a large following, with the membership of the WCG growing to over 100,000, but his management style and unorthodox ideas caused much friction. After his death in 1986, the new leaders of the WCG made doctrinal changes to bring it into line with mainstream evangelical Christianity (Tucker, 1996). Before and after that date, many splinter groups broke away to form new churches, usually retaining a dispensational view of Daniel's seventy-weeks prophecy, whilst often disagreeing with Armstrong (and each other) about the details of what they expected to happen during the final "week" of the world (Thiel, 2008/9; Malm, undated).

It is common for members of such groups, and others interested in biblical prophecy, to believe that each apparent day in the prophecy of Daniel corresponds to a year consisting of 360 actual days (rather than the 365¼ days in our present system). One of the main reasons for this is that *Revelation* chapter 12 verse 6 tells of a woman going into the wilderness to be fed for 1260 days, and verse 14 says she was nourished there "for a time, and times, and half a time". Taking "a time, and times, and half a time" to mean three-and-a-half years, and equating that to the 1260 days mentioned eight verses earlier, one year would consist of exactly 360 days (Davies, 2003; Findlay, undated). However, because of the gap of indeterminate length between the 69<sup>th</sup> and 70<sup>th</sup> "weeks", the date when the final "week" begins cannot be predicted, but there is a general belief amongst those linking this to the sequence of events described in *Revelation* that it will soon be with us, and they are looking for signs of its imminent arrival, or even the possibility that it has already started (Thiel, 2008/9; Lee-Warner, undated; Sides, undated).

This 360-day year had previously been used, during the 19<sup>th</sup> century, by Charles Taze Russell, a restorationist minister from Pittsburgh, Pennsylvania, to calculate the date of the second coming of Christ from information in an earlier part of the book of *Daniel*. Russell, who had founded the Bible Student Movement, and also the Watch Tower Society, which published many of his written works, believed he could deduce the date of the second coming from the fourth chapter of *Daniel* (Penton, 1997). This related how king Nebuchadnezzar asked the prophet to interpret a dream, in which he had been shown a mighty tree, but an order then rang out to cut it down, leaving just the stump of the roots in the ground, until seven times passed over. Daniel responded that the mighty tree represented Nebuchadnezzar himself, and he continued (in verses 24 and 25): "This is the interpretation, O king, and this is the decree of the most High, which is come upon my lord the king: That they shall drive thee from men, and thy dwelling shall be with the beasts of the field, and they shall make thee to eat grass as oxen, and they shall wet thee with the dew of heaven, and seven times shall pass over thee, till thou know that the most High ruleth in the kingdom of men...". Russell extended that interpretation to claim that the "seven times" represented seven symbolic years, each of 360 days, so the total period was  $360 \times 7 = 2520$  symbolic days. He then equated the 2520 symbolic days to 2520 actual years, and said that this was the period from Nebuchadnezzar's conquest of Jerusalem to the second coming of Christ. Believing the fall of Jerusalem to have occurred in October in 607 BC, he therefore calculated that the second coming of Christ would be in October 1914 (Watchtower Society Quotes, undated). Scholars now date the fall of Jerusalem to twenty years later than supposed by Russell, so a period of

2520 years from that event would actually end in 1934. However, neither in 1914 nor 1934 were there any obvious signs of Christ's second coming. Nevertheless, Russell's Bible Student Movement and Watch Tower Society continued to thrive, even after his death in 1916, and out of these eventually emerged the Jehovah's Witnesses religion, which now has 16 million members, including 7 million active evangelists. Taking a line that by now will seem familiar, the founders of the Jehovah's Witnesses established the doctrine that the second coming of Christ really did take place in 1914, but it was a spiritual event rather than the physical one that had been expected at the time (Hoekema, 1963; Frater and Bean, 2008). The fact is that when Russell made his prediction (Russell, 1888), he believed that Christ had already been ruling spiritually in Heaven since 1874, and would descend with his saints to take control of the affairs of the Earth in 1914. Deferring the spiritual coming forty years to 1914, Jehovah's Witnesses believe that Christ then selected 144,000 souls for redemption, as part of the sequence of events leading to Armageddon and the end of the world (Mead, Hill and Atwood, 2005; Franz, 2007).

### **Doomsday cults**

Not all predictions about the end of the world were derived from scriptural sources. In Chicago in the 1950s, psychic power, in the form of automatic writing, was claimed as the means by which a housewife, Dorothy Martin, better known by her pseudonym of Marian Keech, was warned about an impending catastrophe (Carroll, 1994). The warning apparently came from aliens living on a planet called Clarion, who told Keech that the world would end in a great flood just before dawn on 21 December 1954. Keech had formerly been a member of a cult run by Lafayette Ron Hubbard, who subsequently founded Scientology, and many of the ideas of Scientology were incorporated into the beliefs of the much smaller cult organised by Keech from her home in Chicago. A psychologist, Leon Festinger, and some of his colleagues wanted to make a study of a doomsday cult, and they managed to get someone to infiltrate Keech's group. On the evening of 20 December 1954, the members met in Keech's home, expecting a visitor from outer space to arrive at midnight and guide them to a spaceship to escape from the doomed Earth. When nothing had happened by 4 am, and none of the suggested explanations seemed satisfactory, Keech began to weep. However, the bleak atmosphere suddenly changed 45 minutes later, when Keech apparently received another message, which said that God had been so impressed by the commitment and faith of the group, who had left jobs, colleges and spouses, given away money and possessions, and had sat together through the night as instructed, that he had decided to spare the Earth from destruction. A press conference was hurriedly arranged, and the cult, which hitherto had been very secretive, suddenly became aggressive in trying to attract new members.

Festinger and his colleagues published the results of their investigation of this group, and general theories arising out of it, in the book, *When Prophecy Fails* (Festinger *et al*, 1956). Of particular note, they argued that "disconfirmed expectancy", a situation where those who are committed to a prophecy realise that it has failed to come true, leads to a form of cognitive dissonance. Whatever the explanation for the apparent failure, it could *not* have been that the prophecy was simply wrong.

In some cases, this being an example, the hard-core believers suppose that global catastrophe has been averted because of their faith or their prayers, so the rest of the world should be grateful to them, not scornful. In other cases, as we have noted earlier, an expected physical event may be transformed in retrospect into a spiritual event, or the date may be pushed a few years into the future. Those with a scientific background may suppose that these tendencies apply only to non-scientists, but it is not as simple as that. Scientists are people, with similar weaknesses to others people, so can slip into the same dubious behavioural patterns. For example, astronomer and science journalist John Gribbin, together with geologist Stephen Plagemann, argued in *The Jupiter Effect* (Gribbin and Plagemann, 1974), that the lop-sided alignment of the planets on 10 March 1982, with all of them on the same side of the Sun, would create a gravitation pull that would cause catastrophic earthquakes and tsunamis on Earth. In fact there were no significant earthquakes on that day, and high tides were only about 0.04 millimetres higher than usual (Frater and Bean, 2008). Undaunted, Gribbin and Plagemann then wrote *Beyond the Jupiter Effect* (Gribbin and Plagemann, 1983), the cover proclaiming, “Certain of the original conclusions have been abandoned and others modified, but the basic relevance of *The Jupiter Effect*’s arguments have been reinforced”.

Turning back to non-scientists, during the 1970s in California, Marshall Applewhite, a musician from Texas, whose father was a presbyterian minister, began developing a cult which mixed apocalyptic beliefs of Christianity with New Age concepts of travel to other worlds and dimensions. Applewhite claimed to have had a near-death experience in hospital following a heart attack, which led him to believe that he and his nurse, Bonnie Nettles, were the “two witnesses” spoken of in *Revelation* chapter 11 verse 3, and that Applewhite himself was closely related to Jesus (Vallee, 1979). Applewhite and Nettles then founded the cult, which had a succession of names, the final and best-known one being Heaven’s Gate. The cult members believed that the Earth was about to be wiped clean, i.e. all life was to be destroyed, so it could begin again. When an amateur astronomer, Chuck Shramek, claimed to have observed a companion body following comet Hale-Bopp in November 1996, Applewhite believed it to be a spaceship sent to receive the souls of Heaven’s Gate members and transport them to a level of existence above human, if they left Earth by committing suicide just before the cleansing of the planet. The bodies of Applewhite and 38 Heaven’s Gate members were found on 26 March 1997 at the San Diego mansion rented by the cult (Balch and Taylor, 2002). This was therefore one instance where the core members of a cult did not have to come to terms with a failed prophecy.

### **The Mayan “prophecy”: scenarios of a transformation in 2012**

Now let us return to the well-publicised supposition that the writings of Mesoamerican Indians about a future catastrophe, linked to the fact that the Mayan long count finishes on 21 December 2012, means that the Maya had good reason to believe that the world, or at least the world as we know it, will end on that date. To start with it should be made clear that those who have written books or internet pages in support of this notion are not professional astronomers, astrophysicists, geologists or experts in Mesoamerican culture, but people who refer to themselves as “independent researchers”, and generally adopt a New Age or occult perspective. That of course does not automatically mean that their conclusions are incorrect

but, as we shall see, their treatment of evidence and application of logic often leave much to be desired.

Some have developed models from the observations of Dennis and Terence McKenna who, as mentioned earlier, noted in the 1994 edition of their book, *The Invisible Landscape* (subtitled *Mind, Hallucinogens and the I Ching*), that on 21 December 2012, the winter-solstice Sun would be roughly, although not exactly, aligned to the centre of the Galaxy. The McKennas believed that events linked to his date would provide a “potential transformative opportunity” for the Earth’s population. Years before, when they were on an Amazonian expedition to study psychoactive plants, they had a psychedelic experience which enabled them to see passages of the *I Ching*, the Chinese “Book of Changes”, in a new way and link them to the lunar calendar. In the first edition of *The Invisible Landscape* (McKenna and McKenna, 1975), Terence McKenna formulated what he called his ‘timewave zero hypothesis’ and, using the dropping of the atomic bomb on Hiroshima as an historical anchor point, he predicted that rates of change would accelerate exponentially from that moment until mid-November 2012. Later, he moved the whole timewave forward by another few weeks to terminate on 21 December 2012, when that became the accepted date for the end of the Mayan 13<sup>th</sup> *baktun*. On that day, according to the revised timewave zero hypothesis, the world would become a very different place (Heley, 2009, pp. 123-132; Krupp, 2009). In a somewhat similar vein, but relating to a different scenario, at around the same time as the McKennas were putting forward their initial ideas, Frank Waters was suggesting that, although the 13<sup>th</sup> *baktun* was likely to end in cataclysmic earthquakes, this would just mark a transition to a new and perhaps better age (Waters, 1975; Nizalowski, 2000; Krupp, 2009).

Terence McKenna’s adoption of 21 December 2012 as a crucial date owed much to his conversations in California with Minnesota-born José (actually Joseph) Argüelles, a charismatic figure in the New Age movement (Defesche, 2007). In 1987, in a book called *The Mayan Factor – Path Beyond Technology*, Argüelles, who was described on the cover as an “artist, poet and visionary historian”, had written that, on 21 December 2012, a beam would be emitted from the centre of the Galaxy towards our Solar System, linking together people, the planet, the Sun and the centre of the Galaxy, thus advancing the development of life on Earth. He predicted that something similar would also occur on 16 August 1987, to usher in a period of transformation before the end of the present age and the beginning of the new one, but, although thousands of people gathered in sacred places around the world to welcome this “harmonic convergence”, no unusual forces were detected by scientific instruments on that occasion (Argüelles, 1987; Heley, 2009, pp. 51-55; Krupp, 2009).

Interest in the relationship between the galactic centre and the winter-solstice Sun was renewed a decade later with the publication of *Maya Cosmogenesis 2012* (Jenkins, 1998) by the American esoteric author, John Major Jenkins, who had also held conversations with Terence McKenna. Argüelles, McKenna and Jenkins all acknowledged that they considered it likely that the Maya had received insights about the universe in which they were living through drug-induced shamanistic activities, in line with the common New Age belief that, by such means, the ancients had acquired knowledge beyond our understanding (Defesche, 2007; Van Stone, 2008; Aveni, 2009, pp. 32-33, 156-157, 161). In a previous book about the

calendar systems of the Maya, Jenkins made clear his guiding principles, writing, “I primarily wish to promote a visionary approach to these matters, as there is much more to the Sacred Calendar than can be seen with the rational intellect” (Jenkins, 1992). That approach was maintained in *Maya Cosmogogenesis 2012* and related internet essays, where Jenkins stated that a significant “galactic alignment” would take place on 21 December 2012. On that day, there would be an alignment of the winter-solstice Sun with the galactic equator, resulting in “a tremendous transformation and opportunity for spiritual growth, a transition from one world age to another” (Krupp, 2009). There is nothing here, or in the works of Argüelles and the McKennas, about the catastrophic destruction of the Earth on 21 December 2012 but since, as we shall see, Jenkins’ writings about a “galactic alignment” were subsequently developed into a doomsday scenario by others, let us be clear about what Jenkins actually meant by this term.

Our Sun is one of around 300 billion stars making up a spiral arm galaxy. We are currently situated about two-thirds of the way out from the centre (at a distance of around 26,000 light years from it), near the inner edge of one of the arms. The Galaxy is essentially a disc of stars, and a central bulge, sometimes called the nuclear bulge, would be apparent if this disc was viewed from the side (Couper and Henbest, 2000; Moore, 2001, pp. 194-195; Frommert and Kronberg, 2005). From this end-on viewpoint, the horizontal plane cutting through the middle of the disc is termed the galactic plane. The Sun has an oscillating motion at right angles to this, taking about 64 million years to complete a cycle, so it passes through the galactic plane twice during that period. Clouds of gas and dust seem to concentrate close to the galactic plane, so some astronomers have argued that these might disrupt the Solar System’s comets as the Sun passes through this region, causing a potential threat to the Earth (Rampino and Stothers, 1984; Clube and Napier, 1984). Had the Sun been due to cross the galactic plane in 2012, that situation could have constituted a plausible doomsday scenario. However, the Sun is now estimated to be between about 20 and 115 light years distant from the galactic plane, and moving away from it (Humphreys and Larsen, 1995; Branham, 2003; Joshi, 2007; Majaess, Turner and Lane, 2009). Jenkins’ notion of a “galactic alignment” between the Sun and the “galactic equator” was something quite different from the Sun being positioned on the galactic plane. His, like that mentioned by the McKennas, was an alignment purely from the perspective of an observer on the surface of the Earth.

From the Earth, all the stars visible with the naked eye are members of our own Galaxy. Because of our position within the Galaxy, stars can be seen in every direction, most of these being relatively close to the Earth. However, there is a distinct band, known as the Milky Way, which runs right across the sky, consisting largely of more distant stars, towards and beyond the centre of the Galaxy (Couper and Henbest, 2000; Moore, 2001, pp. 192-193, 210-211). Since we are dozens of light years above the galactic plane, we must, of course, be observing from that elevated viewpoint, so it is impossible to relate everything we see to positions either above or below the galactic plane. In 1958, the International Astronomical Union introduced a galactic coordinate system to apply to all the stars observed from Earth, which required the specification of a galactic equator, and it is this, essentially, that Jenkins used as a component of his so-called “galactic alignment”.



Present-day astronomers acknowledge that the position of the galactic equator was determined essentially by drawing a line on the basis of observations of the Milky Way. Even from an Earth-centred perspective, there was a significant degree of uncertainty, because the Milky Way has no clear-cut edges (Krupp, 2009). Nevertheless, although the galactic coordinate system is simply one of convenience for astronomers, and has no meaning except in terms of providing a framework for describing observations from the Earth, its principles were accepted by Jenkins. In this system, as he acknowledged, the centre of the winter solstice Sun as viewed from the Earth was aligned with the galactic equator in 1998, and would not be so precisely aligned in 2012. However, he argued that it was legitimate to regard an alignment as a situation where *any* part of the solstice Sun as viewed from the Earth covered the line of the galactic equator, and that was the case throughout a 36 year period centred on 1998. On that basis, therefore, the last day of *baktun* 13 in 2012 qualified as a galactic alignment (Jenkins, 1995; Jenkins, 1998).

Jenkins pointed out that a wobble in the Earth's orbit around the Sun results in the so-called "precession of the equinoxes", causing the position of the winter solstice Sun to appear to wander around the sky. At the time of the Maya civilisation, the winter solstice Sun would have been observed well outside the bounds of the Milky Way itself, which is why the alignment in 2012 was claimed as a significant finding. Furthermore, the alignment was with that section of the galactic equator within the region of the nuclear bulge of the Galaxy and so, according to Jenkins, could be regarded as being with the galactic centre, skirting round the fact that the actual centre of the Galaxy lies 2° from the ecliptic (the Sun's path as observed from the Earth). However, at least Jenkins was honest enough to acknowledge that, because of the size of the Sun as seen from the Earth (which is half a degree), the intrusion of the winter solstice Sun across the galactic equator had begun in 1980 and would continue until 2016. Nevertheless, because of the end of the 13<sup>th</sup> *baktun*, he was convinced that it would be on the winter solstice of 2012 when something of great significance would happen (Jenkins, 1995; Jenkins, 1998).

Jenkins reinforced his arguments by drawing attention to what is often called a "dark rift" (or "great rift") in the Milky Way, to which the winter solstice Sun in 2012 would also be aligned (Jenkins, 1995; Jenkins, 1998). This was known to the Maya as *Xibalba be*, which, as Jenkins noted, translates as "the road to Xibalba". Xibalba was the Mayan underworld, whose entrance was traditionally supposed to be through a cave near Cobán in Guatemala or another in nearby Belize (Walker, 2000; Jones and Molyneux, 2004, p. 160; Patterson, 2007). Jenkins went on to write that, in Mayan mythology, the dark rift was also regarded as a crevice in the branches of the cosmic tree, the birth canal of the Cosmic Mother, and the mouth of the Cosmic Monster. Those claims are somewhat dubious, being derived largely from his own interpretation of Mayan pictographs, but, in any case, Jenkins was fully aware (because he acknowledged the fact) that the "dark rift" is not actually a crevice in the Galaxy but an overlapping series of interstellar dust clouds lying between the Earth and the stars of the Milky Way, obscuring parts of the Milky Way (including the actual centre of the Galaxy) over one-third of its length, and often appearing to run down to the horizon (as befits a perceived "road to the underworld") (McClure, 2009). Regardless of that, Jenkins continued

to see significance in the galactic alignment of the Sun with both the galactic equator and the dark rift, claiming that this alignment was the basis of the ceremonial ball game of the Maya. In his view, the ball represented the winter solstice Sun in 2012 and the circular hoop into which it was to be inserted represented the dark rift within the region of the central bulge of the Galaxy (Jenkins, 1995; Jenkins, 1998). It will be apparent, of course, that the Sun will not be in line with the actual centre of the Galaxy, and also that the dark rift stretches far beyond the region of the Milky Way which corresponds to the central bulge.

### **The Mayan “prophecy”: scenarios of doomsday in 2012**

Jenkins, by his own testimony, was far from being a hard-nosed rationalist, but he nevertheless tried to avoid departing too far from objective evidence and the constraints imposed by the laws of physics on its interpretation. Hence he was horrified by the way some of his ideas were presented and developed by others, in books and in documentaries on supposedly serious television channels such as *History*, *Discovery* and *National Geographic*. Jenkins himself saw the supposed galactic alignment of 2012 as something that would lead to the regeneration of the Earth, not to its destruction, but that seemed to be lost on those taking his ideas forward. A pre-release publicity write-up for a 2006 *History Channel* programme based on the work of Jenkins began, “The world is coming to an end on December 21 2012! The ancient Maya made this stunning prediction more than 2,000 years ago”. After viewing the programme, Jenkins wrote that it had been “45 minutes of unabashed doomsday hype and the worst kind of inane sensationalism” (Jenkins, 2006).

As an example of similar sensationalism in books, here is what Daniel Pinchbeck wrote in his book, *2012: The Year of the Mayan Prophecy*, published in 2006: “On the winter solstice of December 21 2012, the Sun will rise within the dark rift at the center of our Milky Way Galaxy, an event that occurs once every 25,800 years...Mayan hieroglyphics describe the center of this dark rift as the ‘Hole in the Sky’, cosmic womb, or ‘black hole’, through which their wizard-kings entered other dimensions, accessed sacred knowledge, or toured across vast reaches of the cosmos. In September 2002, astronomers verified the existence of a massive black hole at the center of the Milky Way” (Pinchbeck, 2006). He was clearly suggesting great significance in the association between a dark rift, a black hole and a mythological passageway, all linked tightly to the centre of the Milky Way Galaxy, and the arrival in that region of the rising Sun on 21 December 2012, for the first time in more than 25,000 years. The reality is that: (i) the Sun will not rise on 21 December 2012 “within” a dark rift but in front of a cloud of interstellar dust which, somewhat loosely, has been given that name; (ii) rather than this being a 1-in-25,800 year event, it will have occurred every year since 1980 and will continue to occur until 2016; (iii) Pinchbeck’s interpretation of Mayan pictographs is a personal one, derived from that of Jenkins, and largely speculative; (iv) there is no connection whatsoever between the black hole at the centre of the Galaxy and the dark rift; (v) the dark rift stretches along a large section of the Milky Way, the black hole being close to one of its ends, not to its centre; and (vi) the winter solstice Sun will *not* be aligned with the black hole on 21 December 2012, or at any other time.

Despite the sensationalism, Pinchbeck, in this book and a later one, *2012: The Return of Quetzalcoatl* (Pinchbeck, 2007), was not pointing towards doomsday in 2012 but rather, seeing the black hole as a creative factor, envisaged a transformation into a new age, whose development would be guided by Quetzalcóatl. He claimed that the details of crop circles pointed to a regeneration of the world on 21 December 2012, as did his contacts, as a medium, with the spirit of Quetzalcóatl.

Nevertheless, there has been a proliferation of sensationalist sources, mainly on the internet, asserting that, consistent with what the Mayans had supposedly written, and the immense gravitational intensity of the black hole, some force would be emitted from the galactic centre through the dark rift (which of course is not a rift at all) on 21 December 2012, and cause catastrophic events on Earth. However no plausible explanation was ever given about the nature of this force, and what might have given rise to it. In one scenario, which provided the basis for the 2009 feature film, the galactic alignment would produce an extreme gravitational pull on both the Earth and the Sun (which makes no scientific sense, since the Solar System will be no closer to the galactic centre in real terms on 21 December 2012 than at any other time during the course of human history), causing the release of massive solar radiation which would heat up and hence destabilise the inner Earth, resulting in the continents sliding around in catastrophic fashion, huge volcanic eruptions taking place, and tsunamis being generated. In fact there is no known mechanism which could cause the continents to change their positions rapidly. Although continental movements are known to have taken place in the past, this has always been over a timescale of millions of years (Handwerk, 2009; Morrison, 2009). Another problem, common to all scenarios involving the galactic alignment, is why extreme forces should be generated on the winter solstice of 2012, when they were not generated on the corresponding day of every year from 1980 onwards, even though essentially the same galactic alignment was in place on each occasion.

2012 doomsday scenarios which invoke mechanisms other than galactic alignment are no more plausible. One of these is that the solar sunspot maximum due in 2012 as part of ongoing cycles will be particularly energetic, with massive solar flares releasing streams of charged particles of sufficient intensity to cause a reversal of the Earth's magnetic poles. While this geomagnetic reversal is taking place, the Earth's magnetic field will be disrupted, and the protection it gives us against dangerous radiation from space greatly reduced. Some, particularly the Belgian writer, Patrick Geryl, have further claimed that the geomagnetic reversal will be followed by a reversal of the Earth's rotation, causing a physical pole shift, catastrophic earthquakes and tsunamis (Geryl and Ratinckx, 2001; Geryl, 2005; Heley, 2009, pp. 153-167; Joseph, 2010). These more extreme speculations have little scientific basis but, in any case, there is no reason to suppose that previous geomagnetic reversals have been triggered by emissions from solar flares. Moreover, the latest indications are that the current sunspot cycle will not peak until May 2013, and is likely to be a fairly weak event (Handwerk, 2009; Minard, 2009; Morrison, 2009; Hudson, undated).

Another scenario put forward is that the alignment of planets in 2012 will cause massive earthquakes and tsunamis because of gravitational stresses. This of course is a return to the notion of the "Jupiter effect", even though the alignment in 1982 had caused no problems,

and neither had an alignment of five of the planets in 2000. In fact there will not even be an alignment of planets in 2012, for, throughout that year, the planets will be scattered around the Solar System (Krupp, 2009; Morrison, 2009).

In 1995, a Wisconsin woman named Nancy Lieder claimed that she had been contacted by grey aliens from the Zeta Reticuli star system to warn her that a cosmic body four times the size of the Earth was heading into the Solar System and would come so close to us in 2003 that the world would be brought to the brink of destruction (Plait, 2008). When nothing happened in that year, Lieder said that she had told (or been told) a white lie about the date to prevent those in power increasing the death toll by forcing people to remain in cities (Lieder, 2003). This was seized upon by some 2012 doomsday enthusiasts, who claimed that the real date of close approach was December 2012. These also gave the hypothetical cosmic body, called planet X by Lieder, the name Nibiru, borrowing this from an unrelated catastrophist scenario by the writer Zecharia Sitchin (Heley, 2009, pp. 207-213). The space agency NASA pointed out that an incoming body of that size would already have been detected by them, and nothing of the kind had been seen, but they were then accused by the believers of trying to stage a cover-up (Handwerk, 2009; Krupp, 2009; Morrison, 2009).

Another scenario is based on the fact that some spiral galaxies similar to our own are known to have experienced violent explosions radiating out from the core. A controversial American independent researcher, Paul LaViolette, who has a PhD in physics, argued in his book, *Earth under Fire* (LaViolette, 2005) that such explosions may occur in all galaxies on a periodic basis. The Earth may have experienced the catastrophic effects of a superwave of energy from an explosion at the centre of our own Galaxy in the prehistoric past, and a further explosion might cause another superwave to reach us in the not-too-distant future, possibly preceded by a “gravitational wave”. LaViolette has estimated that there is a 90% chance of this happening during the next four centuries. He has also suggested that the Mayans might have known that a superwave was already on the way, and would reach the Earth in 2012 (Heley, 2009, pp. 133-142). However, even if an explosion generating such a superwave had indeed occurred, how could the ancient Mayans have been aware of it, since even today we have no reason to suppose that an event of that nature has taken place?

Needless to say, the name of Nostradamus has been invoked by 2012 doomsday enthusiasts, including ones who ought to have known better. In 1982, Italian journalists Enza Massa and Roberto Pinotti came across an unpublished book in the Italian Library in Rome, which has been taken by some to be a lost work by Nostradamus. Cryptic illustrations from this book, together with equally cryptic quatrains from earlier works, have been said, for example in a 2009 *History Channel* documentary *Nostradamus 2012*, to be suggestive of a prophecy of doomsday events in that year (Hundley, 2010). The quatrains gave no dates, so the association with 2012 was inferred solely from the illustrations in the “lost book”. In particular, one illustration showed, as a relatively minor feature, three objects which resembled round biscuits, with a substantial bite taken out of each. This was taken by the makers of the *History Channel* programme to point clearly to 2012, since that would be a year of three eclipses: an annular eclipse of the Sun in eastern Asia and the western USA; a transit of Venus (i.e. a passage of Venus across the face of the Sun as viewed from the Earth);

and an eclipse of the galactic centre by the Sun. Regardless of whether Nostradamus could possibly have known about any of them, and whether the second could be considered a valid interpretation of the illustration, given the tiny relative size of Venus, causing it to appear as no more than a small dot passing in front of the Sun, the third is clearly invalid because, as mentioned previously, the Sun as viewed from the Earth never eclipses the actual centre of the Galaxy. So, the contents of this *History Channel* programme failed to stand up to any kind of scrutiny. In similar fashion, a 2010 *National Geographic* channel programme, *2012: The Final Prophecy*, enthused about an illustration in the Mayan document known as the *Dresden Codex* (because of where it is now kept), which was claimed to show evidence of a catastrophic flood bringing the world to an end in 2012. This illustration included a representation of a dragon-like figure in the sky spewing water from its mouth onto the Earth beneath, which has been taken by some, although by no means all, experts in Mesoamerican mythology to indicate the onset of a terminal world-flood. However, no date was given, so the link with 2012 is entirely spurious (Handwerk, 2009; Hoopes, 2011).

### **The end of the 13<sup>th</sup> *baktun***

When all is said and done, the only Mayan link to 21 December 2012 is that the 13<sup>th</sup> *baktun* ends on that day. The Maya may have envisaged future catastrophic events, but they never attributed a specific date to them, nor did they associate them with the Milky Way or the winter solstice, to which they showed no significant interest (Aimers and Rice, 2006; Van Stone, 2008; Aveni, 2009, pp. 54-57). It seems that, to the Maya, the “long count” was simply a dating system, no more and no less. Just as we have minutes making up hours, hours making up days, days making up months, years and centuries, and ten centuries making up a millennium, with a new millennium beginning as soon as the previous one has been completed, so the Maya had a long-count made up of *tuns*, *katuns* and *baktuns*, with a new cycle beginning as soon as the previous one had been completed (Schele and Friedel, 1990; Van Stone, 2008; Handwerk, 2009; Morrison, 2009). Rather than supposing that the world was going to come to an end with the completion of *baktun* 13 on 21 December 2012, various Mayan sources indicate a continuation of life into the future. Although some imply that the calendar would be re-set at the end of *baktun* 13, others suggest that the re-setting would come at a much later stage, saying that 20 *baktuns* make a *piktun* (Grube, 2000, p. 138; Douglas, 2009, p. 86; Krupp, 2009). Also, long-count numbers are sometimes given in inscriptions together with a distance-number, which must be added together to give a future date. So, for example, a panel at the Temple of Inscriptions at Palenque gives a long-count date for the coronation of Pakal the Great, which corresponds to 27 July AD 615, and then adds a distance-number to indicate a date when it says that Pakal’s coronation will again be celebrated. This distance-number takes the long-count date to the end of the 20<sup>th</sup> *baktun*, corresponding to 21 October AD 4772 (Schele, 1992; Van Stone, 2008; Douglas, 2009, p. 133; Krupp, 2009). It might have been optimistic to suppose that Pakal’s coronation would be celebrated on that far-distant date, but it certainly shows that the writer of the inscription did not expect the world to come to an end at the close of the 13<sup>th</sup> *baktun*.

So, there is no reason to suppose that the Maya believed the world would come to an end on the day corresponding to 21 December 2012, and no evidence from the Earth or the cosmos

which could have enabled a rational prediction to be made of a global catastrophe on that date.

### **Plausible and implausible scenarios of future catastrophes**

It will be apparent from what has been said previously that many of those making predictions of an imminent doomsday, regardless of whether they were New Age mystics or religious fundamentalists, have claimed they were acting as mouthpieces for aliens or for God, or to have obtained special insights by reaching a higher state of consciousness, perhaps drug induced, or through meditation and guided reading of the scriptures. They have also often pointed to the dire state of the world, with wars, natural disasters, famines and the breakdown of social order, as evidence that the end-times are fast approaching. That is a beguiling argument but, in fact, writers in various periods throughout history have complained that they were living in particularly troubled times. Doomsday prophets of every age have taken a similar approach to those of today, and so far, of course, their predictions have always turned out to be wrong.

Hence we have every reason to be sceptical of a prediction of a doomsday catastrophe on a particular day, or even a particular year, unless supportive objective evidence and rational arguments can be produced, and hitherto both have been singularly lacking. On the other hand, we know with certainty that, in principle, catastrophes *could* occur which would threaten life on Earth on a regional or even global scale. However, we have no way of knowing whether any of them will happen in the near future, current indications being that that is unlikely. Here are some examples.

On average, a supernova explosion occurs within 33 light years of the Earth every 240 million years, releasing gamma rays which could be lethal to life on our planet (Ellis and Schramm, 1995; Melott *et al*, 2004; Firestone, West and Warwick-Smith, 2006). A disaster film entitled *2012: Supernova* was released in 2009, but the association with 2012 was simply an attempt to jump onto the bandwagon of the doomsday hype. We have no objective indication about if and when a supernova explosion will next threaten life on Earth. Lethal gamma-ray bursts could also come from a source other than a supernova explosion, but, again, we currently have no means of knowing when one might threaten us (Henbest and Couper, 2001, pp. 146-151; Nakar, 2007; Naeye, 2009; Matthews, 2010).

The impact of a 10 km diameter asteroid or cometary nucleus, as occurred at the time of the extinction of the dinosaurs and many other well-established species 65 million years ago, when around 70% of existing species were wiped out, would probably not entirely eliminate life from Earth today, but would certainly cause great devastation, and leave an extremely harsh environment for the survivors to cope with (Alvarez, 1997; Frankel, 1999; Palmer, 2003, pp. 202-205, 215-246). There are currently no 10 km asteroids in Earth-threatening orbits, but collisions within the main asteroid belt, or elsewhere in the Solar System, could change that situation (Farinella, 1996; Bailey, 1998; Henbest and Couper, 2001, pp. 68-84). Similarly, long-period comets with a 10 km nucleus could sweep in from the outer Solar System and threaten the Earth with only a few months warning. In April 1996, comet

Hyakutake, albeit a relatively small object with a nuclear diameter in the range 2-5 km, swept past the Earth only two months after its first discovery (Levy, 1998; Burnham, 2000; Henbest and Couper, 2001, pp. 84-93). There are around 1,000 even smaller 1 km diameter asteroids or comets, mostly asteroids, classified as Near-Earth Objects (NEOs), of which around 150 are further classified as Potentially-Hazardous Objects (PHOs) (Chamberlin, 2011). An impact by one of these would be much less damaging than one by a 10 km object, but would still cause an explosion around 100,000 times more powerful than that in Tunguska in 1908 (Chapman and Morrison, 1989; Steel, 1995; Naeye, 2009). However, the next possible impact by a *known* object of this size will be one by asteroid 1950 DA in the year AD 2880 (Giorgini *et al*, 2002).

In 1883 the volcano Krakatoa, west of Java, erupted with an explosive power about 5 times greater than that of the Tunguska event of 1908, giving rise to a tsunami which killed 40,000 people (Francis, 1993, pp. 73-83, 377-379; McGuire, 1999, pp. 61-62, 129-130; Scarth, 1999, pp. 134-155). Some have argued that, given appropriate circumstances, an eruption on this scale, or perhaps a little larger, could have been the primary cause of one or more of the environmental crises which occurred during the medieval period (Stothers, 1998; Keys, 1999; McCormick, Dutton and Mayowski, 2007). Be that as it may, volcanic eruptions many times more powerful than that involving Krakatoa in 1883 are well within the bounds of possibility. On several occasions in the past, so-called supervolcanoes have erupted with a force over 100 times greater than the Krakatoa blast. The most recent was 26,500 years ago, the Oruanui eruption of New Zealand's Taupo volcano, which covered most of the two islands with tephra and ash, up to 200 metres deep in places, as well as depositing an 18 cm ash layer on the Cheetham islands 1000 km away (Wilson, 2001; Manville and Wilson, 2004; Wilson *et al*, 2006). Before that, the Toba supervolcano in Indonesia erupted about 75,000 years ago, producing a caldera more than 50 km in diameter, and throwing so much dust and ash into the upper atmosphere that temperatures throughout the world fell significantly and remained low for up to 10 years (Francis, 1993, pp. 296-298, 388-389; McGuire, 1999, pp. 74-86). It has been estimated that only around 40% of the world's human population survived this period of hardship, leaving just 1,000 or so pairs to breed, which caused an evolutionary bottleneck (Ambrose, 1998; Castleden, 2007, pp. 40-42; Robock *et al*, 2009). The next supervolcano to erupt is thought likely to be the one in the Yellowstone region of the western USA, which has erupted several times previously, most recently around 640,000 years ago, when it deposited thick coverings of magma and ash over most of the USA west of the Mississippi and part of north Mexico. This supervolcano now seems to be building up towards another eruption. When this comes, it seems inevitable that it will cause immense devastation to the USA, and also cast its shadow further afield, but whether the eruption will be in the near or more distant future remains uncertain (Francis, 1993, pp. 298-300; McGuire, 1999, pp. 84-85, 96-108; McGuire, 2005, pp. 75-83; Naeye, 2009).

All of this is well established. Although we cannot say when, or what the magnitude will be, we can be sure that, at certain times in the future, the Earth will be subjected to a burst of lethal gamma rays, an asteroid impact or the eruption of a supervolcano. In addition, there is the possibility of a disastrous encounter with a black hole, a geomagnetic reversal, the arrival

of a new, uncontrollable pandemic, the sudden appearance of an anomalously large solar flare pointing towards the Earth, or the self-inflicted tragedy of a nuclear war (Naeye, 2009). Furthermore, oxygen-isotope ratios in deep-sea sedimentation cores show that, for whatever reasons, average temperatures during the course of life on Earth have changed, sometimes quite rapidly, by amounts which are far greater than ones currently considered dangerous by those concerned about the prospect of global warming (Officer and Page, 1993, pp. 113-124; Lamb and Sington, 1998; Lewin, 1999), and there is no reason to suppose that similarly large fluctuations will not occur again in the future.

There are also some further catastrophist scenarios which, although they have yet to progress beyond the “theory” stage, deserve to be given serious consideration. A particularly relevant example is the “coherent catastrophism” model of British astronomers, Victor Clube and Bill Napier, which maintains that a giant comet began to disintegrate in the inner Solar System around 20,000 years ago, the breakdown products including comet Encke, at least ten objects now classified as Apollo asteroids, the Taurid meteor stream and copious amounts of dust and boulders. Encounters between the Earth and clusters of this debris would lead to reduced temperatures at the surface of the planet, because of the accumulation of dust in the atmosphere, and in showers of fireballs resulting in a multitude of small impacts, which in turn could generate tsunamis, earthquakes and volcanic eruptions (Clube and Napier, 1990; Steel, 1995, pp. 109-136; Clube, 1998; Napier and Asher, 2009). This Clube and Napier model, or something similar, provides a plausible explanation for at least some of the environmental crises of the past 5,000 years, when there were falls in temperature associated with all kinds of celestial phenomena, earthquakes, floods and other disastrous events. However, there is insufficient evidence for it to have been established with any degree of certainty that an encounter with a cloud of cosmic debris was a significant factor on any of these occasions, or for it to be possible to predict when the next manifestation of coherent catastrophism might occur.

## **Conclusions**

Life on Earth is under threat from a variety of causes. Nevertheless, there is no specific reason to think that any natural catastrophe of a global nature will occur within the next few decades. That possibility cannot be entirely excluded, but statistically it is unlikely. We, as individuals, are far more at risk from situations such as crossing the road or, as we found out recently, from eating salads containing uncooked sprouted seeds. However, the world will undoubtedly experience another major catastrophe at some time in the future.

So, what can we conclude? The writings of the Maya, like those of the Aztecs, their successors as the major force in Mesoamerica, show clearly they believed there had been a series of ages, with the gods bringing about catastrophic transitions between them. Similarly, the Jews of Old Testament times believed that God intervened in events on Earth, sometimes bringing about major catastrophes. The early Christians maintained this tradition, also believing that God, in the form of the returning Jesus, would carry out a stern “last judgement” and then bring the world to an end, in terrifying circumstances. Many Christians have retained this belief to the present day.



The background to the history of the Christian world was far from being one of environmental stability or gradual change. Instead, the timeline was punctuated by periods of environmental crisis, during which, probably with at least some partial linkage, significant political changes often took place. Also, these periods were generally associated with sights in the sky which terrified those observing them. It is understandable that, in those superstitious times, many took these, and other terrible events taking place, as indications either that God was asking for change, or that the second coming or end of the world was approaching. The date feared for one or other of these latter possibilities was generally the next thousand-year one in the *annus mundi* system currently in use or in the AD system. In the supposedly less superstitious period from the 19<sup>th</sup> century onwards, when it was becoming generally accepted that environmental crises were caused by natural processes, not the will of God, some Christians, particularly in the USA, went in the opposite direction, away from rationality, in formulating dates for the second coming or the end of the world on the basis of supposedly inspired interpretations of passages in the books of Old Testament prophets. Many people were only too willing to accept their conclusions. Similarly, many of a New Age persuasion were happy to accept predictions of the end of the world supposedly communicated by aliens, or obtained by fanciful interpretations of ancient Maya writings. There is no rational reason to suppose that doomsday will arrive on 21 December 2012, the end of the 13<sup>th</sup> *baktun* in the Mayan calendar, or on 21 October 2011, as predicted by Harold Camping. The predictions made by generators of doomsday cults are meaningless, and most have already been proved wrong by the passage of time. Yet, although the formulation of specific details such as dates and mechanisms may be irrational, the general belief that the world, or at least the world as we know it, might come to an end in catastrophic fashion in the not-too-distant future, is a perfectly rational one. In the past, doomsday beliefs have received their impetus from the periods of environmental crisis and terror experienced by populations. In more recent times we have begun to understand the nature of the processes and forces which combined to cause such episodes, and to realise that those same processes and forces, as well as others, could give rise to similar, or even much more severe, environmental crises in the future. However, our knowledge and understanding is still extremely limited – we surely have a great deal more to learn about our history and our environment.

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