

REVIEWS

EXPECTING CATASTROPHISM

Trevor Palmer, *Perilous Planet Earth: Catastrophes and Catastrophism Through the Ages*. New York: Cambridge University Press, 2003. Pp. 522 + ix. \$75.00 HB.

By Hiram Caton

Trevor Palmer's study is a thoroughly researched, well-written addition to what is now a small library documenting catastrophes in Earth history and in the history of civilization. As he shows, catastrophe chronicles occur in the earliest written records, commonly embedded in religious sagas. Enlightenment thought rejected catastrophes as a residue of superstition, largely because sudden violent disruptions were deemed, like miracles, to be incompatible with Nature's 'universal laws'. The equation of law-like behaviour with irenic regularity was inspired by planetary astronomy, which enjoyed regal status as master of calculable natural phenomena. It was at odds with other phenomena (such as earthquakes, volcanoes, tsunamis, or sudden climatic changes) that were unpredictable then and remain so today. The recalcitrant phenomena were subdued to irenic regularity, called 'Uniformitarianism' by philosophical fiat: they were deemed to be minor agitations, devoid of scientific or philosophical implications. The motivation of this error, as we now think it to be, was the removal of divine agency from scientific explanation and its correlate, the supposition that human weal and woe depend upon human decision. If so, there would then be no natural impediment to the extension of the 'conquest of nature' to lift the human condition to ever greater improvement. This optimistic vision drove the politics of progress. It seemed a self-evident truth in an age when machines of power constantly multiplied in number and efficacy.



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These days everyone accepts that planet Earth has from time to time taken big hits from vagrant rocks and is sure to take some more. We 'know' it partly because large-scale calamities make terrific cinema and partly because the 'Spaceguard' front office issues scary bulletins on near-Earth crossings of asteroids and comets.

Awareness of heavenly peril, Palmer reminds us, is recent – basically since about 1980. It arose from intense focus on the planetary system incident to space exploration and its novel data-sources (fly-bys, landers, orbiters, and deep probes). It was found that the inner planets rotate through a 'cosmic shooting gallery' whose volleys come from the asteroid belt, positioned between Mars and Jupiter. There have been many thousands of strikes on the inner planets and their satellites. The lunar surface records them like a photograph. Indeed, the shooting gallery is so lively that asteroids strike asteroids! This was confirmed in 2000 when a satellite went into orbit around asteroid 433 Eros, taking remarkable pictures of many craters. The Eros mission results underscored the fact that hundreds of millions of loose rocks in eccentric orbits make the inner solar system a dangerous space. Yet asteroids and comets are not the only perils. The Earth's declination on its axis, movement of the magnetic poles, solar flares, coronal mass ejections, and the remote gravitational and radiation effects of supernovae are other factors affecting life on Earth. Few will deny Palmer's thesis that the discovery of these hazards marks a major shift in how we conceive our place in Nature.

The case establishing catastrophes was the mass-extinction controversy instigated by Luis Alvarez's evidence that an asteroid strike caused the K–T boundary extinction that carried off the dinosaurs and much else. This claim, intensely divisive at the time, is no longer contested, though the details are disputed by Vulcanists, who argue that a flood basalt eruption was an additional factor in the K–T extinction, and by some palaeontologists. The Permian extinction, which destroyed 92% of life on Earth, is thought to have derived from an impact, and some geologists suspect that all five of the major mass extinctions derive from impacts or impacts plus volcanic activity set off by impacts. Historically, mass extinctions were the watershed issue between 'Catastrophists', led by Georges Cuvier, and the 'Uniformitarians', led by Jean-Baptiste Lamarck and Charles Lyell (the labels were coined by William Whewell in a review of Lyell in 1832.). This encounter, the initial phase of which fell between 1810 and 1830, merits close attention. Palmer notes that Cuvier's Paris Basin palaeontology persuaded him that mass extinctions occurred

repeatedly, followed by repopulation by new taxa. Mass extinctions seemingly correlated with the geological evidence of sudden crustal elevation and subsidence (styled 'revolutions') which Cuvier interpreted as the proximal cause of extinctions. This led him to reject Uniformitarianism, together with Lamarck's transmutationism.

Uniformitarianism eventually prevailed, but on the basis of what arguments? I found Palmer's review of the arguments a little thin. He notes that Lyell's rebuttal of Catastrophism in the *Principles of Geology* became the gold standard of English geology, and of transmutationism when it finally came to flower. In the post-*Origin* phase, Lyell was commonly said to have demolished the Catastrophist case. Palmer does not however review Lyell's arguments. Let me do so briefly.

The chapter devoted to Catastrophism in the *Principles* discusses no catastrophist empirical arguments or data, names no names, and cites no sources. It consists instead of a prolix, beguiling admonition that belief in catastrophes is a covert defence of miracles. It is devoid of evidence and shirks the burden of philosophically evaluating principles, for example, the correlation of strata with an algorithm of time lapse. Lyell's Uniformitarianism construed Earth history as a cyclic repetition of subsidence and elevation. This effectively denied that Earth has had a history. The empirical basis for placing an arrow of time on Earth history was the hypothesis of Earth's cooling from its origin as a condensate of a gaseous mass (the Nebular Hypothesis) – a position defended by Cuvier's disciple Élie de Beaumont. In the eleven editions of the *Principles* stretching over nearly four decades, Lyell never systematically discussed the heat dissipation hypothesis and its empirical geological evidence, despite the fact that thermodynamics emerged as the basic of the physics of that age, and despite the fact that Britain's leading physicist, Lord Kelvin, placed the age of the Earth squarely on geology's agenda with a proposed method of time-lapse mensuration. To be sure, English geologists, notably Charles Darwin, quietly took on board the Earth history thesis, but without acknowledging its apparent inconsistency with Uniformitarianism and without giving it force by devising improved time mensuration methods. Given the centrality of Uniformitarianism to his theme, Palmer should, I suggest, have devoted more space to these details.

While the acceptance of catastrophic impacts by the science mainstream dates from the K–T mass extinction dispute, New and Old World archaeology had long produced evidence of major natural

disasters causing the destruction of cities or whole regions. Thus, the French archaeologist Claude Schaeffer argued in the late 1940s that the Bronze Age civilization in Asia Minor had been devastated by natural catastrophes. Schaeffer's work was taken up by the Belgian mathematician-engineer René Gallant, who argued in his *Bombarded Earth* (1964) that asteroid strikes might have caused widespread destruction. But archaeology was no less committed to the Uniformitarian dogma than geology, and for the same reason: calamities, even when proffered as purely natural, nevertheless provided moral support for 'Biblical archaeology', and thus tainted 'pure science'. Professional conformism accordingly subdued such mavericks by ignoring their evidence. The author who forced purists to take notice was Immanuel Velikovsky, whose books on cosmic calamities reached a wide public (e.g. *Worlds in Collision*, 1950).

Velikovsky combined evidence gleaned from ancient texts, archaeology, and astronomy to revise the accepted chronology of early civilization and to depict, in dramatic scenarios, the fateful grip of planetary events on human events. He wrote at a time when the UFO phantasy was fashionable and when the unfanciful threat of nuclear destruction was a fundamental feature of global politics. UFO apologists boosted their case by alleging that government agencies deceitfully denied what they knew to be the truth. Anti-nuclear advocates made the same charge about governments' concealment of the dangers of nuclear testing from the public. Velikovsky laid the charge of duplicity at the door of archaeologists and astronomers, who reluctantly responded by organising high level forums to debate his, for them, preposterous speculations.

In 1975, a group of catastrophe-minded innovators established the Society for Interdisciplinary Studies to promote catastrophe research by providing a forum for exchange of ideas. The Society was inspired by Velikovsky's example, but pledged allegiance to no specific catastrophe scenario. (And Velikovsky's work is now discredited). Over the following decades it brought together the scientists, archaeologists, engineers and independent scholars, who produced most of the research and publications that establish terrestrial catastrophes as historical reality. Palmer dedicates his book to members of the Society (and the similarly oriented Cambridge Conference Network); about half of the text is given to summaries of this research, including the on-going internal criticisms and new findings that winnowed eccentricity from the literature and established catastrophes as accepted topics in archaeology, palaeoclimatology,

geology and related disciplines. A count of this literature cited by Palmer yields eighteen titles between Victor Clube and Bill Napier's *The Cosmic Serpent* (1982) and David Webster's *The Fall of the Ancient Maya* (2002).

It would be fitting if Palmer had concluded his assessment of catastrophist research with a philosophical statement about how it alters our view of mankind's place in nature. He contents himself instead with repeating the conventional wisdom that we must know the dangers if we are to counter them effectively. Undoubtedly. Yet this does not address the contingency of perils that exceed the international community's capacity to mount an effective response. Global warming is such a candidate contingency. The Kyoto Accord sets forth a schedule of emissions retrenchments deemed by experts to be necessary if industrial civilization's looming self-inflicted disaster is to be averted. Yet the global warming question has been demoted to low priority in the electoral politics of many democratic nations. Perhaps one shouldn't expect consumer societies to shut down the party while it is going strong.

Griffith University
Faculty of Arts
Nathan, Queensland, 4111
Australia