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52. I. Velikovskiy, *Ramses II and his Time*, *op. cit.*, chapters I and II (note in particular the footnote at the end of chapter II).
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55. II Kings, chapters 19-23.
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## A Response to Cardona's Objections

Marinus Anthony van der Sluijs

In his book *Metamorphic Star*, Dwardu Cardona raises a number of objections to my ideas [1]. I thank him for considering my work and furthering research into the intriguing topics at hand. In answer, I submit the following reply. [The book was advertised in *C&CW* 2012, p. 26].

On pp. 45, 51, Cardona imputes two changes of mind to me. First, that the earth was not 'in polar alignment' with cosmic bodies associated with mythical beings, as I had claimed earlier [2]; second, that the Egyptian Pyramid Texts did not situate the supreme deity at the pole, as I had indicated earlier [3], but perhaps at the zenith or elsewhere. The former allegation is correct; a change of mind is salutary in research if it is based on new information and fresh insights, as it was for me roughly between 2002 and 2005. As for the latter, contrary to Cardona's paraphrase, my original statement was not that the location of the supreme deity at the heavenly pole was 'quite obvious' in the Egyptian Pyramid Texts, but merely that 'Some of the *Pyramid Texts* appear to locate the supreme deity at the heavenly pole'. The matter is less straightforward than Cardona suggests. It is true that I consider an interpretation of 'zenith' instead of 'rotational pole' for some passages; this is inspired by Faulkner's translation of the phrase *yzkn n pet* as 'zenith (?) of the sky', with a question mark [4]; the meaning of *yzkn* remains disputed among Egyptologists. As far as I am concerned, that the Pyramid Texts situate Rē' or other deities at the rotational pole remains possible, but conjectural [5].

Similar puzzles beset other parts of the ancient Egyptian literature. Cardona cites Rundle Clark's translation of this passage in the Coffin Texts:

The Great God lives,  
fixed in the middle of the sky upon his support ... [6]

Although a long-time favourite in the Neo-Velikovskian tradition, this translation is unfortunately invalid, illustrating the importance of returning to the original language when interpreting texts. The Egyptian text – *'nh wr htm hr(y)-yb pt* – contains no term for 'support' [7]. Clark seems to have erroneously read *htm* as *htmt*, which means 'chair' in a Greek papyrus [8]. In this passage, *htm* is clearly the verb meaning 'to provide' [9] or 'to be provided with', 'supplied with' [10]. Thus, a correct translation is: 'O great living one, O you who are provided in the midst of the sky' [11], or, taking *'nh* as a verb, 'The Great One lives; the one in the middle of the sky is equipped'. Although Cardona, on this occasion, leaves out the words 'upon his support', he does repeat Clark's word 'fixed' and even adds emphasis to it. This is lamentable, considering that this word was an interpolation that does not reflect anything in the Egyptian original; the text plainly concerns neither fixation nor support. This leaves one with the meaning of the phrase *hr(y)-yb pt* ('the middle of the sky'). In the absence of a word for 'fixed', an association with the celestial pole and hence a stationary deity seems unwarranted. Perhaps the reference was to the ecliptic band or even the place of sunrise, perceived as the 'heart' or innermost part of the sky as it leads into the underworld. Certainly, there the sun god was expected to be provided with his solar-day barque, which is what the text seems to allude to. Finally, even an entity 'fixed' in the sky does not necessarily have to be stationed at one of the rotational poles; the zodiacal light is an example of an atmospheric phenomenon with a fixed appearance in the sky that is not at the pole. That said, the possibility certainly remains that the celestial north pole was intended in other passages in the funerary literature of ancient Egypt. The upshot is that each individual passage must be sedulously

examined in its own right.

On p. 52, Cardona reasons that, at early times, no technical term may have existed for the rotational poles and that, during the Palaeolithic age, the stars were not even visible, according to a universal human tradition, so that the rotational poles at that time could not be identified by terrestrial observers. I share these views, to the extent that the invisibility of the stars lasted a few decades to centuries at most, not for untold ages as Cardona holds. However, this only increases the *onus probandi* on those who maintain that the rotational poles were referred to in certain early sources; hence my emphasis on ancillary considerations such as an association with the apparent revolution of the fixed stars or with the far north or south [12].

Cardona appears to be selective in his use of sources, as some traditions situated the 'stationary sun' of the age of creation in other places than the rotational pole. For example, the Bella Coola (central coast of British Columbia) told that 'the Sun had staid [sic] in the east' in the early stages of history [13]. The northwestern and northeastern Maidu (Butte and Plumas Counties, California) held that the Sun and the Moon used to be fixed in the east [14]. The Diēri (central Australia) recalled a time when 'the sun ... had never previously set' [15]; they knew of a 'hole' in the west, situated 'about twenty-five miles from Killalpanina, towards Lake Eyre', which they called *Dityi-minka* ('hole of the sun'), as it was in that that 'the sun at one time lived', before it 'found its way' to the corresponding hole in the east 'and continued to follow that course.' [16] The Ngarinyin (Kimberleys, northwest Australia) informed that, before 'the little sun has made her journey from the east to the west to give the world day and night', this one and her larger mother used to dwell permanently in the east, causing excessive heat:

Long, long ago, in the East, behind the world, there lived two suns. A big fat mother sun and a little daughter sun. They lived in hollow logs. They came out to give the world light, but they shone so fiercely and for so long that everything began to burn up. [17]

If traditional cultures preserved memories of the original location of mythical entities 'by simply pointing in the right direction', as Cardona asserts, material such as the above falsifies the hypothesis of a single prototype for a 'sun' fixed above one of the celestial poles. Nor is Cardona's method failsafe, as it does not take human migrations into account. If the original forms could not be located using the stars as a frame of reference, people on the move could hardly be expected to be able to track their position in the sky. For people moving into previously populated areas, one might well argue that the memory of the original direction in the sky was passed on to the newcomers, but this cannot be maintained for peoples that moved into uninhabited territory, such as the Hawaiians or the Icelanders.

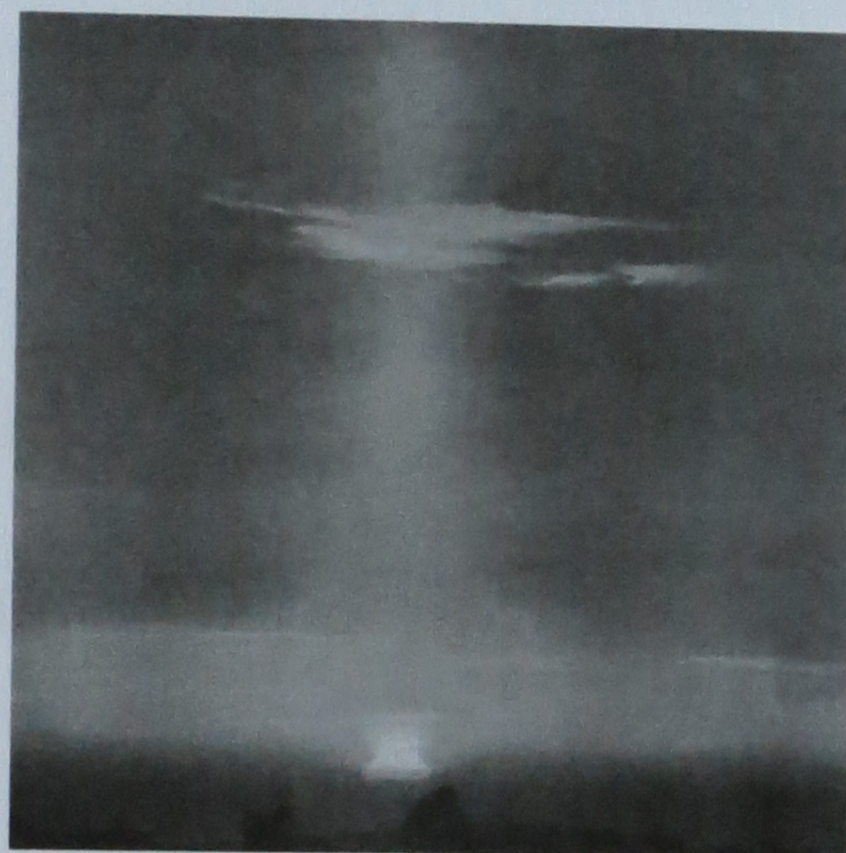
On p. 71, Cardona correctly points out that Thomas Gold's notion of an intense solar storm was only a thought experiment. However, scientific evidence has since emerged that such 'storms' occur on sun-like stars [18] and that they occurred on our Sun during the late Pleistocene epoch [19].

On p. 72, Cardona cites me regarding the possible transformation of the polar aurora into a stupendous column. I have never conducted any scientific work and Anthony Peratt, whom I cited, is the authority to address here, as Cardona goes on to do.

On pp. 73, 79, Cardona holds me responsible for estimating that the intense aurora lasted decades and sets up a

contrast with Peratt's estimate of centuries or millennia. However, I attributed my estimate to Peratt, whom I was paraphrasing, and opted for this lower figure to err on the side of caution. Ordinary auroral displays are measured in hours or days. By comparison, a duration of decades is extreme. To suggest that I was differing from Peratt in this respect is disingenuous. To be sure, Peratt did state that individual petroglyphs may have been carved 'perhaps over a decade' as 'the displayed figures in the sky evolved' [20] and that 'each of the patterns ... could have occurred repeatedly over months or a decade.' [21]

In a Thunderbolts 'Picture of the Day', I had discussed the theme of a 'string' holding together the 'worlds' according to a Hindū text. On p. 73 of his book, Cardona takes me to task for calling this object a 'sun pillar', as this is a term used for an optical meteorological phenomenon. That I am well aware of what 'sun pillars' are is easily demonstrated by my inclusion of them in a list of atmospheric-optical transient events that was published in 2010 [22]. Cardona appears to



Sun pillar display in San Francisco.

© 'Brocken Inaglory', Wikimedia Commons

have overlooked the quotation marks between which I had placed the term 'sun pillar' in the essay in question; although singles in my original text, the editor of the Thunderbolts website unfortunately rendered them as doubles. However, from the context, there could not have been any doubt that I was not referring to the atmospheric-optical phenomenon.

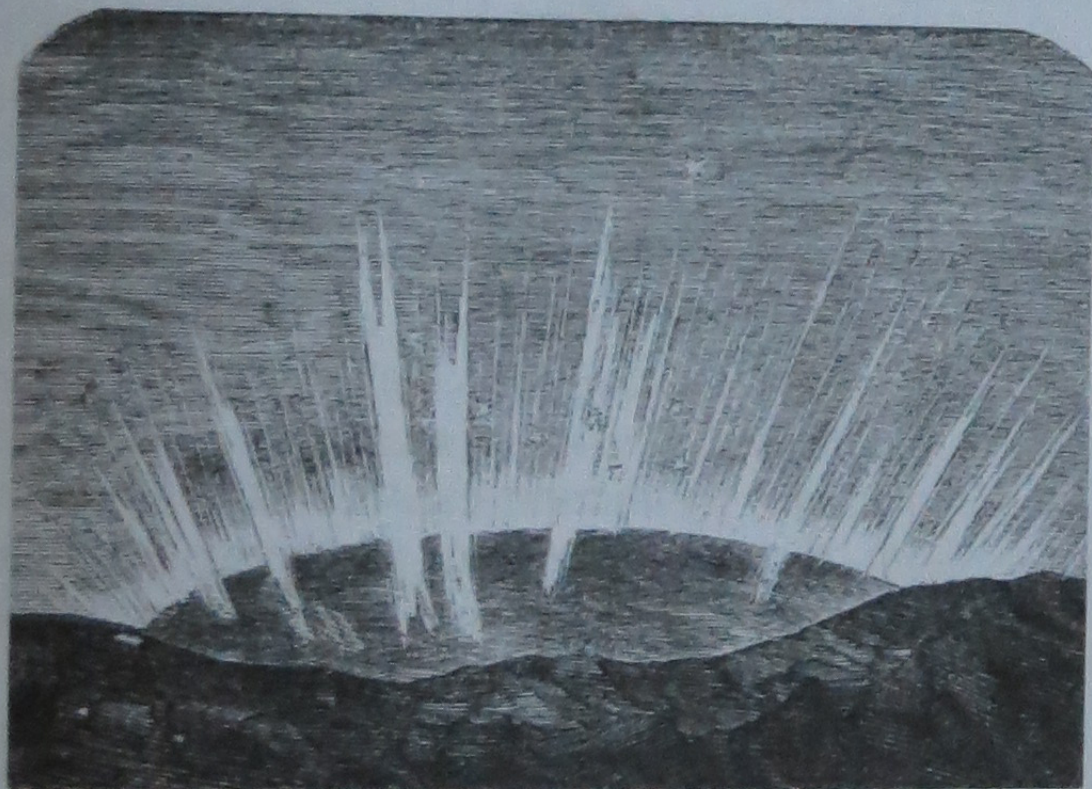
Finally, I did not employ this phrase (sun pillar) 'Because of the so-called auroral nature of the apparition', as Cardona indicates, but because I was discussing a number of Hindū sources concerning a string suspended from the Sun. In interpreting historical texts, I always proceed from an apparent 'surface' meaning to deeper levels of analysis instead of starting from a preconceived theory.

On pp. 73-75, Cardona criticises me for supposing that the 'sun' in these Hindū sources was the actual Sun, yet his conviction that the Sun was **not** intended does not rest on his philological analysis of this source material, but is his *a priori* assumption. I grant that these sources may ultimately concern a different 'sun' than the quotidian Sun, but this cannot be assumed at the outset; it has to be carefully argued.

Starting from my speculation that the solar wind may at times have been visible to human observers, Cardona highlights contradictions between the notion of the Sun, rising and setting as usual but with a visible solar wind, and the *axis mundi* of myth. Yet Cardona's entire discussion of this Thunderbolts 'Picture of the Day' is a red herring, insofar as I refer neither to the *axis mundi* nor to Peratt's 'column' in this text; it was an isolated thought-experiment, based on relatively late Hindū material, that may or may not relate to the mythology of creation.

The confusion is a consequence of Cardona's choice to raise objections against my ideas before I have published them in a final, annotated format. It is only now, in early 2013, that I have begun work on the first publication in which I will present my views on the origin of creation mythology at length. What I have stated earlier on this subject were mostly hints, suggestions, thought-experiments and citations from Peratt, often published on Internet pages rather than in print. Had Cardona waited for my actual treatment of this subject, he would have noticed that I do not believe the Sun – or the Moon or the other stars, for that matter – to have been visible to humans from the earliest times they remembered to the demise of the *axis mundi*. In prematurely applying my separate speculations on the possible former visibility of the solar wind to creation mythology and the time of the *axis mundi* ('if it is these particular currents that are relied on for the formation of an auroral pillar'), Cardona has set up a straw man. Not all 'mytho-history' needs to refer to *illud tempus*, what I was suggesting was that some traditions independent from 'creation mythology' may refer to the solar wind. In the case of an intense aurora associated with creation mythology, the solar wind may or may not have been visible; the Sun was certainly not, according to the emphatic testimony of the traditions.

On pp. 73-74, Cardona makes it seem as if I admitted that auroral pillars are not actual aurorae. In reality, I merely left the option open, but believe such pillars to be actual aurorae, as indicated by the sources I cited from Medieval Europe and East Asia. In the literature on auroral physics, 'pillars' are a well-established typological category of polar aurorae, which are usually referred to as isolated auroral rays. For example, Elias Loomis grouped auroral forms into five categories, one



Various auroral rays and an arc

Source: E. Loomis, *A Treatise on Meteorology; With a Collection of Meteorological Tables*. Harper & Brothers, New York, 1868, p. 175, Fig. 69.

of which were 'Slender, luminous beams or columns, well-defined and often of a bright light. These beams rise to various heights in the heavens from 2° or 3° up to 90° or more; sometimes, though rarely, passing the zenith ... Sometimes they remain at rest, and sometimes they have a quick lateral motion. This light is commonly of a pale yellow, sometimes reddish, occasionally crimson, or even of blood color.' [23]

William Corliss' opinion [24] that such 'auroral pillars' may not be actual aurorae was no more than his opinion; it is not for nothing that I relegated it to a footnote. Cardona uses Corliss' observation that 'auroral pillars' often have 'a bearing well away from magnetic north' as an argument against their auroral nature. However, the aurora is not always restricted to the direction of magnetic north, but may occasionally be seen towards any direction, depending on the direction of the local magnetic field. An auroral arc, for

instance, 'is frequently displaced, and is transported parallel to itself from north to south, or from south to north. An arch which first appears near the northern horizon sometimes rises gradually, attains the zenith, descends toward the southern horizon, remains there for a time stationary, and then perhaps retraces its course. ... In the United States the motion from north to south is about ten times as frequent as the motion from south to north. Sometimes there is a movement of the arch from west to east, or from east to west.' [25] In a Chinese report such as the following, for 26<sup>th</sup> February AD 996, specialists are agreed that an aurora is referred to:

During the night in the west there were eight bands of greenish-white vapor of varying lengths like the brooms of comets. Their ends passed through the Milky Way and intertwined like writhing snakes. [26]

Needless to say, the aurora further appears overhead instead of being confined to the north at any location where a 'corona' is seen – sometimes at low latitudes. For example, as a part of the 'Carrington Event' Benjamin Vial Marsh observed a corona from the latitude of Burlington, New Jersey (40° North) on 28<sup>th</sup> August 1859:

Between 9½ and 9¾ P. M. there was a perfect corona; the streamers on the south side were short, and mostly white, and moved pretty rapidly westward. Their number at one time was probably five or six. [27]

Nor are digressions from the magnetic pole restricted to arcs, bands and coronae; during the same 'Carrington Event', John Baptist Austin, stationed at Kapunda, South Australia (34° South), reported a veritable pillar in the west:

... on Friday, Sept. 2nd, when the most gorgeously brilliant display took place. ... about nine o'clock, a huge pillar of fire appeared in the west, where it remained until midnight. [28]

Examples of such genuinely auroral pillars, seen towards various directions of the compass and sometimes persisting for hours, could be multiplied *ad nauseam*. Reading Cardona's observations on these 'auroral pillars' gives me the impression that Cardona is fairly unfamiliar with the literature on auroral physics and based his comments almost exclusively on the material supplied in my writings on the subject. As in 2005, I maintain that auroral pillars of this type are not exact analogues of the *axis mundi* remembered in traditional cosmologies, but are a close generic relative of the hypothetical 'mother' of such pillars.

On pp. 73-74, Cardona's assertion that 'a steady and unchanging brightness' is 'hardly descriptive of auroras the lights of which are anything but unchanging and/or steady' is fallacious; while the aurora often passes through highly dynamic phases, equally characteristic are a quiet, stable arc resting over the horizon or a passive red background glow persisting for hours.

On p. 79, Cardona reasons that a prolonged intense solar storm, as envisioned by Peratt and initially also myself, would have stripped Earth of the magnetic field on its day-side – and to be sure, this is in keeping with Gold's scenario for short-lived solar outbursts. Yet Cardona's objection that mankind could not have survived such an event flies in the face of empirical evidence. At this point, it is necessary to distinguish between a weak geomagnetic field *per se* and intense solar storms, as these are not necessarily causally related. That the geomagnetic field was far weaker throughout the late glacial period than it has been in historical times was confirmed independently by palaeo- and archaeomagnetic measurements, whether this was due to the behaviour of the Sun or other decay mechanisms. A weaker geomagnetic field is expected to incur stronger

auroral activity simply because the magnetosphere is less efficient in diverting inflowing charged particles away from Earth's atmosphere. Eminent geophysicists theorise that a dramatically enfeebled geomagnetic field facilitates **geomagnetic reversals and excursions**, the former of which no living being has experienced in some 780,000 years, the latter in 2,500 to 10,000 years or more [29]. Such conditions may in theory have been precipitated by a prolonged increase in solar output; if electric-universe theory correctly asserts that the Sun is a node in a galactic electrical circuit, a sustained solar output exceeding historical levels seems an entirely reasonable proposition. On top of that come actual 'intense solar storms', of a much shorter duration. LaViolette offered a detailed analysis of the evidence for extreme solar proton events at the end of the Pleistocene epoch based on varve and ice-core records, which would almost certainly have annihilated the geomagnetic field for shorter periods [30]. While mass extinctions apparently did occur throughout this period [31], a total extermination of all life is not called for. It goes without saying that many life forms have survived such events in the past.

On pp. 79-80, Cardona states that the auroral ovals cannot possibly have assumed the form of 'a tubular structure or a funnel of any sort, from anywhere on Earth.' But this statement seems precarious. If anything, the auroral ovals already delineate the base of funnels in the present contours of the geomagnetic field, where Birkeland currents coming in from the magnetosphere are channelled towards the magnetic poles. Furthermore, it is well known that the structure of the geomagnetic field changes dramatically in the course of geomagnetic reversals and excursions. On one hand, the altitude and the diameter of the auroral ovals may vary considerably in the course of such events. On the other hand, Earth's magnetic poles drift towards the equator on such occasions and are eventually overtaken by non-dipole families such as the quadrupolar and the octupolar components of the geomagnetic field. In a forthcoming publication, I will suggest that these conditions provide the ideal backdrop for what human traditions reveal concerning the *axis mundi* [32].

If, following Peratt's suggestion, each magnetic pole was encircled by an auroral oval which formed the base of a visible column, the outcome consists in multiple and moving columns, allowing global visibility of the phenomena. The magnetic poles and their associated columns will have co-rotated with Earth, thus preserving a stationary appearance; for an excursion lasting a millennium, the members of the dipole family would have moved slowly enough to have given human witnesses the impression of a motionless phenomenon, while the quadrupole is thought to remain unaffected by excursions anyway. If the influx of sunlight was dramatically reduced at the same time, as the myths suggest, these columns would have appeared as a semi-permanent phenomenon, visible throughout the 'day'. A scenario of this sort should lay Cardona's concerns to rest.

On pp. 80-81, Cardona observes that a hollow plasma cylinder enclosing Earth, such as Peratt postulated, cannot possibly have appeared to human observers as 'a distinct pillar supporting the sky above'. I concur with this and reject this aspect of Peratt's hypothesis.

On p. 81, Cardona erects another straw man when he links my speculations on the familiar tunnel of light in near-death experiences to Peratt's concept of a hollow plasma cylinder enveloping Earth. There is no connection between these two, because, as stated, I do not endorse this element of Peratt's scenario. Earth is enveloped by a magnetic field at all times and it is this condition that I referred to in the Thunderbolts

'Picture of the Day' in question. What I said there, phrased very carefully, is that some people may have **secondarily** associated the atmospheric plasma column known from their inherited traditions with human souls, based on their observation that the soul in altered states of consciousness seems to traverse a very similar 'tunnel' with light inside or at its terminus. This says nothing of the accuracy of the comparison between the respective pillars of visions and cosmologies or their nature.

On p. 82, Cardona submits that experiments on *terrellae* may be more conducive towards modelling aurorae than Peratt's setup. This is a fair comment, which converges with my citation of *terrella* findings in support of an intense-auroral theory of creation mythology. As it happens, the *terrella* does yield 'polar columns' as well as multiple columns distributed over the entire surface of Earth and I hypothesise that these are states which even the geomagnetic field might attain, under extreme circumstances. This refutes Cardona's claim that 'no columnar structures have yet been propagated through the utilization of these terellas' [sic]. My forthcoming book contains a full discussion of this subject.

In addition to all these points from *Metamorphic Star*, in a more recent article Cardona addresses the problem of the global visibility of 'celestial events ... maintained to have taken place in Earth's north celestial pole, a region that would not have been visible from lands south of the equator' [33]. He makes much of a supposed 'Aboriginal' myth of the deluge, which, in his paraphrase, relates 'the departure of the Saturnian deity, Noah/Karen, into the sky beyond Earth's north celestial pole where "he turned into a twinkling star and took up residence in the heavens for ever."' [34] He goes on to speculate that this and other myths resembling themes from the northern hemisphere 'were introduced into the continent by a second, and later, incursion of Aboriginal peoples' than the original, very early wave. While this *ad hoc* solution is not unreasonable in itself, I consider it to be inadequate for the simple reason that mythical motifs paralleled on the northern hemisphere permeate virtually all of native Australian mythology, as well as the traditions of countless cultures in South America and sub-equatorial Africa. No systematic distinction can be discerned between mythology from the northern and southern hemispheres; cross-cultural themes associated with the 'creation of the world' are global in extent almost without exception, as is easily verified in my recent tetralogy *Traditional Cosmology* [35]. Cardona's recourse to a hypothetical diffusion of ideas from the northern to the southern hemisphere inexorably leads to an intellectual *cul-de-sac*.

That aside, the example Cardona cites does not appear to be supportive of diffusion, as it seems to be invalid as stated. Cardona's identification of the originating culture as 'Aboriginal' is as vague and unhelpful as the qualifications 'native American' or 'European'. What is the exact provenance of this myth? The references Cardona supplies are: P. Grimal, 'Greece: Myth and Logic', *Larousse World Mythology*, London 1972, pp. 118-119; F. Guirand, 'Greek Mythology', *New Larousse Encyclopedia of Mythology*, London 1972, pp. 188-190. It is always hazardous to cite secondary instead of primary sources and Cardona's curious preference for secondary and tertiary works undermines much of his research in general. In this instance, I checked both Guirand and Grimal and was unable to find any mention of the myth of 'Karen'. In its original form, the myth in question was published in 1956; it was collected by Roland Robinson (1912-1992), a highly esteemed Australian writer, from Djinu Tjimari and Mardinga, two informants of the Murrinh-Patha nation (Wadeye, Northern Territory). The text

refers to the deity as 'Karan' and makes no mention of 'Earth's north celestial pole', but gives the following account of Karan's catasterism:

Karan flew away. All the bird-people watched him. He flew high. He went up into the sky and sat down alongside Meerk the moon. [36]

In a summary of the myth he published 10 years afterwards, Robinson interpreted the words 'alongside Meerk the moon' as referring to 'a star close to the moon' [37], seemingly unaware that the Moon is in constant motion with respect to the stars; did the informants perchance perceive Karan as a sort of 'man in the moon'? Whatever the answer may be, this myth clearly has no bearing on the question of whether the Murrinh-Patha were aware of the north celestial pole, even though their homeland lies only at 14° south. More generally, it must also be borne in mind that Australia's contemporary natives are exposed to the same cultural media as the descendants of immigrants; it is, therefore, no surprise that other myths Robinson recorded from the continent include direct references to Africa and India [38]. The myth of Karan bears the hallmarks of an indigenous tale, but comparative mythologists are always advised to concentrate on the earliest recordings of a tradition. Passing over myriads of similar problems with Cardona's use of sources, I should like to conclude with the following challenges to Cardona:

- Considering that the celestial pole appears very low above the horizon at equatorial latitudes, how could peoples at these latitudes have perceived a putative polar column as a 'high' vertical object, joining Earth to the sky?
- Considering that the celestial north pole is not visible from the southern hemisphere, how could traditions of a putative north-polar 'sun' and column have arisen on the southern hemisphere?
- Find an example of cognisance of the celestial north pole on the southern hemisphere at a higher latitude than 10°, or *vice versa*, in a culture unaffected by 'western' tradition and using a primary source.
- Find an example of the planet Saturn as a 'sun' in a tradition from Africa, East Asia, Oceania, the Americas or early non-classical Europe, using a primary source.
- Find an example of the planet Saturn as a 'sun' in any tradition antedating the 7<sup>th</sup> century BC, using a primary source.
- Find an example of the planet Saturn at the pole in a tradition from Africa, Oceania, the Americas or early non-classical Europe, using a primary source.
- Find an example of the planet Saturn at the pole in any tradition antedating the 3<sup>rd</sup> century BC, using a primary source.

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As well as having written for the SIS, Marinus Anthony van der Sluijs is the author of several books and a comprehensive list of these can be accessed at his website - [www.mythopedia.com](http://www.mythopedia.com)

## A Reappraisal of Deep Time in a Nova Scotia Coalfield

Milton B. Zysman

[Milton Zysman has previously published articles discussing in depth the evidence for the formation of parts of Earth's crust by alien deposits from cometary tails. See Notes and references section.]

### Speaking of Deep Time

A recent New York Times op-ed item indirectly focused on the theme of this essay – Deep Time. Paul Krugman, a Nobel Laureate economist, was castigating Republican Senator Marco Rubio, a 2016 fundamentalist presidential hopeful, characterising his scientific credentials as follows:

Reading Mr. Rubio's interview is like driving through a deeply eroded canyon; all at once, you can clearly see what lies below the superficial landscape. Like striated rock beds that speak of deep time, his inability to acknowledge scientific evidence speaks of the anti-rational mind-set that has taken over his political party. [1]

If I read Mr Krugman's rather strained simile correctly, he considers Senator Rubio's fundamentalist views to fly in the face of our planet's history clearly imprinted in the layered rock revealed in road cuts.

Thus, the edict of Deep Time proclaimed in Victorian England by Sir Charles Lyell and his protégée Charles Darwin has moved from a fundamental tenet of Earth Sciences to a necessity for a 'rational mind set'.

This paper is not intended to support the Senator's creationist beliefs, though some of their arguments deserve and are given consideration here, but it is a principle objective of this work to put the question of rational mind-set into play. We will track the centuries old history of Deep Time to argue that it may well be that it is Earth Scientists, rather than the Rubios that have lost their rational mind-sets.

### Earth's Crust

A significant portion of Earth's crust is organised into strata. Wikipedia defines strata as layers of '... sedimentary rock or soil with internally consistent characteristics that distinguish it from other layers'. Sediments, in turn, are defined as 'mineral or organic matter deposited by water, air, or ice.' [2]

The fundamental importance of these strata are stated by the *New Encyclopaedia Britannica*: 'the proper sequence of the layers exposed in any particular outcrop - be it as extensive as the Grand Canyon or as limited as a small road cut - can be determined. ... As the only tangible record of a certain past interval at a certain place, every sedimentary outcrop is essentially the sole source of whatever is to be learned about that interval in that place.' [3]

However, care must be taken with these records and the *Britannica* points out one of their serious deficiencies: 'Unfortunately, when the geologist finishes interpreting a single sedimentary outcrop (exposure), he has only the story of an unknown time interval from somewhere in the vastness of the past.' [4]

The *Britannica's* cautionary attitude comes from its understanding of the disconnected nature of what is called the geological column. Even the most conservative geologist concedes that, within a particular era, sedimentation proceeded at markedly different rates at different places on the globe.

Nonetheless, these equivocations only mask the fact that most of Earth's history, exemplified by complex stratigraphical sequences, is entirely missing from substantial expanses of Earth's surface. These anomalies, called 'unconformities', while highly relevant to our inquiry, are not the most serious challenge to conventional geological theory. A distinctive alien quality to this planet's surface has slowly emerged in recent decades.

Following the Glomar Challenger's investigation of the ocean depths in the 1960s, Brian J. Skinner reported their findings in *American Scientist*. 'Crustal rocks appear literally to be a penultimate silicate froth of the most uncommon terrestrial elements...'. The writer concludes:

Because the earth and oceans and air are extreme distillates and fractionates of the average original earth and very unlike it in composition and origin, it is obviously risky, if not misleading, to infer that superficial studies tell much of what we must know of time in the earth. [5]

More recently, geologists sampling the lavas from Pacific volcanoes have found in them a critical number of trace-elements unlike that of surrounding rocks [6]. Enlarging these anomalies are the volumes of sediments contained in some strata. They are truly prodigious, dwarfing their assumed igneous mother-rocks by a four to one ratio at Earth's surface [7]. For example, a single stratum of sediments in eastern Canada [8] is estimated to exceed 29,000 feet (or 8.7 kilometres) deep and cover half the province of Nova Scotia. They can vary in content from thick bands of pure evaporates, such as salt, phosphate and gypsum, to the more familiar limestones and mudstone (shale), and all these strata can cover thousands of square kilometres.