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Recovering the Lost World, A Saturnian Cosmology -- Jno Cook Chapter 26: Hezekiah and Babylon.



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Jastrow: *Sun and Saturn*

The *Enuma Anu Enlil* records have been used by the Saturnians of Thunderbolts.info as one of the sources for the concept that Saturn was known in antiquity as "the Star of the Sun" and in fact was considered to be the Sun -- especially when translated as "Sun Star." Cardona and other Saturnians who have justified this position with reference to an essay by Morris Jastrow, "Sun and Saturn," written in 1910, have been faulted for ignoring some of Jastrow's comments.

To quote Leroy Ellenberger:

"According to Morris Jastrow, Jr., in his 'famous' and oft-cited article 'Sun and Saturn,' Saturn was not given a specific name until after Venus and Jupiter were named, which is surely strange if Saturn was the primordial deity described by the 'Saturnists.'" [note 1]

This sequence of naming, and similar faults, is entirely resolved if it is understood that this record (of the planets) was created in 685 BC or shortly thereafter. Note is made first of Mars and Mercury because of their interference with Earth since 806 BC. Venus was noted because in 776 BC it may have struck Mars (and the Moon) with a thunderbolt. Venus went nova along with Mercury in June of 685 BC. Mars and Mercury were also the two planets most frequently seen in the sky.

These planets were already in the record. Jupiter is noted next after it expanded into a coma later in July of 685 BC. Saturn, located almost twice as far from the Sun as Jupiter, was not noted until later yet, when it also developed a coma, but after Jupiter had become very prominent, or perhaps had calmed down again. Saturn thus comes last in the record because it was the last to light up.

Dwardu Cardona, in an autobiographical essay titled "The Road to Saturn" (excerpted from *Aeon*, 1988) wrote, about the revelation of Saturn as a night Sun by Jastrow:

"In the fall 1975 issue of Kronos, [Lewis] Greenberg and [Warner] Sizemore published a half-page article titled 'Saturn and Genesis.' In it they briefly analyzed Maurice [Morris] Jastrow's 1910 paper, 'Sun and Saturn,' in which the Assyro-Babylonian belief in Saturn as a sun that shone at night is discussed at some length. ... When I unearthed and read Jastrow's original paper, I became convinced that Saturn, despite the author's expected disclaimer, must have been a true sun of night, radiating its own light."

Cardona takes no account of the fact that the portions quoted by Jastrow from the *Enuma Anu Enlil* date most likely to the 7th century BC, not to the era of circa 3100 BC or earlier. I would suggest that this "sun of the night" notion was an idea surviving from antiquity, and Cardona sees it this way, but understands it as contemporaneous with the "Age of the Gods," instead of an observation dating to after 685 BC. Its use needs to be contextualized to the era in which it was written and needs to be understood as answering to political circumstances.

I think that there would be no mention at all of a "midnight sun" unless it again became relevant in late antiquity, as in 685 BC after Saturn also gained a coma, following a much more massive and visually more impressive expansion of Jupiter. Also, I do not think Saturn was the main concern of the Babylonian astrologers, but Jupiter. It was Jupiter which had lightened the skies as the "midnight sun" for a thousand years.

It seems, from Jastrow's article, that the *Enuma Anu Enlil* has nothing to do with Saturn at the pole, since by the most generous guess the data sources only date back perhaps 1000 years before 700 BC. And I even doubt that, and certainly for the data on market prices for barley. Factoids from 3400 years previous would be useless as prognostication of current conditions to the compilers after 685 BC, in addition to the fact that guessing at the future was a recent preoccupation, dating back perhaps 500 years. Almost all of the tablets deal with the Sun, the Moon, and the weather. Only the last 20 tablets deal with planets.

The *Enuma Anu Enlil* has nothing much to do with Saturn. Jupiter is indicated when "Shamash" is mentioned, and not Saturn. "Shamash" translates as "sun" from the Sumerian glyph, Utu. And Jupiter was the most recently recognized "sun of the night," not Saturn. Additionally, Jastrow is basing his "Sun equals Saturn" identity on an offhand remark by Hyginus, made 3300 years later, and on the translation of the name Shamash from Akkadian to mean "Big Steady Light in the Sky." So, Jupiter was not big and steady?

I would suggest that the astrologers of Babylon added annotations to their tablets to make sure that their notes would not be misunderstood. Shamash was the "sun of night" and understood to be the planet Jupiter. But after Jupiter lighted up in July of 685, Saturn followed suit, and started to blaze like a sun. Although this could be called "Shamash," it needed to be distinguished from Jupiter acting in the same capacity.

Jastrow says his opinions are based also on "contextual" readings. But here is the real context: The compilations were made under pressure from the Assyrians, who revived themselves in 740 BC. So we need to look at what happened after 740 BC. Certainly older records were incorporated, but not likely much further back than about 747 BC, when the skies changed. As I have noted earlier, others

have pointed out that there are apparently no records for the period of approximately 750 BC to 700 BC.

Records from 1200 BC, when attention first starts being given to omens, tokens, and magical predictions, probably were not used, unless they dealt with mundane phenomena like early morning cloud cover -- if that was available at all. The objection posed by Ellenberger to the "order of naming planets" is invalidated by the fact that the "naming" followed the order of the outward travel of the nova event of the Sun after 685 BC, and has nothing to do with non-existent "records" dating back to 3100 BC. The Sumerians were not even writing in 3100 BC, and certainly were not at that time concerned with fortune telling or what the morning clouds meant.

... Mercury

No one, in the meantime, has explained the prominence of Mercury, which is almost impossible to see in today's arrangement of the Solar System. Even Jastrow writes:

"On the basis of passages like these it was natural to conclude that Mercury was for some reason regarded as the planet par excellence. I accepted this view and for the later period it appears indeed to be correct. Traces of the special position accorded to Mercury are to be seen in the multifarious traits with which he is endowed in Greek and medieval astrology. He is the only one of the planets who is conceived as both male and female and embodies, as it were, a summary of the qualities of all the planets."

If this does not date these records to being very late, what will? Jastrow takes note of the lack of physical significance of Mercury, something we know already:

"On the other hand, it was difficult to find a satisfactory reason for this supposed preeminence granted to the smallest of the planets and the one most difficult of observation, whose actual role, moreover, in Babylonian-Assyrian astrology does not at all suggest that the omens connected with Mercury had any special significance."

Is this amazing? It is also a fact that many peoples (even the Celts in Roman times, 700 or 800 years later), held Mercury in great awe. It was not only difficult to find a reason, it has proven to be impossible. No archaeologist has ever figured out the overwhelming prominence of a planet that could not be seen. Since 685 BC Mercury could almost not be found. It is only seen near the horizon just before sunrise or after sunset and only for a few days in the year. Because of this Mercury is the least significant of the planets, yet in antiquity he held a position as the God of language, magic, crafts, trades, and travel.

We know of the change which removed Mercury from the heavens. Jastrow does not, and he assumes that Mercury has always been diminutive and insignificant.

... dates

I looked by chance at an essay, "History and Science" at the University of Oklahoma, concerning the *Enuma Anu Enlil* which read:

"For centuries... [they specify 1600 to 700 BC] ..., [records were kept] because the scribes provided counsel for the king...."

Never mind the rest. They did not, not during that period, only after 750 BC or so, and then the "kings" were Assyrian monarchs, the overlords of Babylon, who would impale you if you crossed them. Where does all this claptrap come from? I get the feeling that the *Enuma Anu Enlil* has been caught up in a series of misreadings spanning 2700 years.

The records in question collate information from the past, but all offer specific data only from after 650 BC. This has long been known of the Babylonian records, although Jastrow makes the unlikely suggestion that some predate the period of Hammurabi (circa 1700 BC in the consensus chronology). In actuality, the dates do not matter, for the Babylonian astrologers were attempting to forecast events for their Assyrian overlords on the basis of desperate guesswork, using any available records whatsoever.

That, in addition to Jupiter, Saturn was also called "sun" (Shamash) is no surprise at all. Saturn indeed had been the Sun at one time -- and certainly the "sun of the night" until 3147 BC. But it was Jupiter who had been the "sun of the night" after 3147 BC and with some interruptions for a thousand years, until 2150 BC.

Some 1500 years after Jupiter had diminished in size to become a star, the Babylonian astronomers were suddenly pressed into service by the Assyrian kings, because of the destructive close passes of Mars, and then the start of the explosive nova event involving Venus and Mercury, after which Jupiter -- the night Sun -- blazed again in 685 BC, and was followed later by Saturn.

The names of the planets to be watched, which included Mars and Venus (and Mercury), were derived from a 3000-year-old tradition. In the newly developed astrological database being devised in the 7th century BC, Venus and Mars were thus named before note was made of Jupiter and Saturn -- and in that order, as Ellenberger noted.

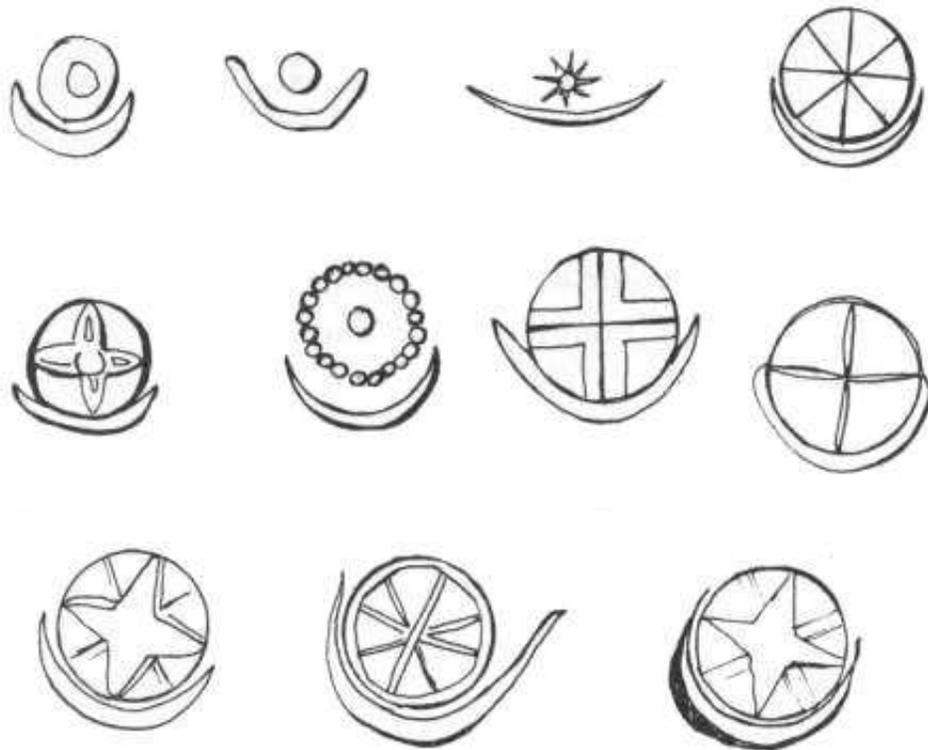
Everyone understood that Jupiter should be called a "night Sun" if it brightened. Duplicated use of "Shamash" could be sorted out when seen in context in most cases. Some tablets, however, were annotated with indications of whether the daytime or nighttime Sun was meant, and to which planet the name "Shamash" would apply in any particular instance. Seen in this context, the *Enuma Anu Enlil* is not a good source for suggesting that Saturn had stood in the sky as a sun before 3100 BC. It mostly speaks to Jupiter and certainly speaks only to conditions after 685 BC.

... Halos and Crowns

I think a greater fault is that none of the Saturnian commentators have done anything to address some of the truly strange wording of the tablets, like:

- "Saturn [Lu-Bat Sag-U] stands in the halo of the moon"
- "The moon has a halo around it and Saturn [Lu-Bat-Sag-U] stands in it."
- "If Shamash [(An) Ut] enters into the moon...." there is a note "Saturn (Lu-Bat Sag-U?) entered the moon".
- "When the sun [Shamash] stands in the place of the moon..."
- "When a mock-sun [Rum-me, sun-circle] stands over the moon (or) under the moon..."
- "If Shamash has a halo around it, there will be rain." with the note "Shamash of the day"
- "When Jupiter [Sag-me-gar] [stands] in the sun [An-Ut]..."
- "If Venus approaches Shamash, the King will perish." with a note explaining that here by Shamash the Sun is meant.

The essay, "Sun and Saturn," by Morris Jastrow is commentary on the translations by others, by the way. The parentheses and brackets in the quoted text above are insertions by Jastrow.



[Image: Various "star in crescent" illustrations from worldwide sources; after David Talbott.]

The illustrations above are from Talbot's *The Saturn Myth* (1980), and some might date to from before 3147 BC. The star image in that case consists of plasma streamers in glow mode connecting to Mercury (thought to be Venus) from Saturn. The left-right crescents and some other forms are missing in this collection.

Some more descriptions from Jastrow:

- A "sun-crown" above Venus...
- "Dilbat [Venus] is decked with two crowns."
- "A 'Shamash' crown above the moon, is explained as 'Lu-Bat [Saturn] [standing] by the moon.'"
- "If a mock-sun stands above the moon or below the moon..."
- "If Mars reaches the road of the sun [the ecliptic] ... there will be a famine."
- "The mock-sun and moon appear together," explained as "on this night Saturn approached (or 'was near') the moon."

The first three notes dealing with crowns need some comments from Jastrow. It is a footnote which unabashedly presents this information:

[footnote 24] *"These 'crowns' above Venus, of which various kinds are mentioned in the Anu-Enlil series -- dark, white, green, dark-red, broad, small, 'rain-bow crown', 'sun crown', 'moon crown', 'Jupiter crown' [reference deleted] -- clearly refer to rays above Venus, the different colors being ascribed to different planets standing in front of her, green = Mars, dark-red = Mercury, while other designations, similarly, describe the supposed specific causes, a 'rain-bow' crown being due to the rain-bow, a 'moon' crown to the moon etc."* [reference deleted]

Jastrow justifies the texts of the tablets in uniformitarian terms, as with:

"Strange as it may seem to us, the planet Saturn appears to have been regarded as 'the sun of the night' corresponding to Shamash as 'the sun of the daytime' and the cause of such light as the night furnishes. It was argued, that since there was a sun furnishing the light of day, so there must be some corresponding power which causes the illuminations of the heavens at night."

It is difficult to conceive of a more patronizing attitude toward the "magicians and astrologers" of Babylon. To think they reasoned that there "must be" a Sun of the night, is to assume that they were no brighter than 6-year-old children.

... refraction

Besides the fact that such absurd reasoning degrades the intellectual abilities of the Babylonians, this supposition (and others about "atmospheric phenomenon") is not necessary. The "crescent of the Moon," seen below, above, even on both the left and right, or seen in multiple units, plus the various colors, is the diffraction of the light of a very bright planet on approaching the last remaining band of the equatorial rings. This had been the case since 2349 BC when the Absu disappeared, but only at this time, at the press of the Assyrian kings, was it necessary to compile all available data and try to make sense of it.

The refraction pattern would be placed some distance away, probably 1/4 or 1/2 wavelength of the striations, and thus perhaps 1/4 spherical degree to the left and right, and make it appear as if the planet were placed within a Moon. Mesopotamian "Star and Crescent" images show the star consistently well within what would be the orb of the Moon, a situation which could not happen if the crescent genuinely belonged to the Moon. The above and below crescents of the moon (a waxing or waning Moon in the first quarter or last quarter) only happen in the tropics.

The left and right diffraction, when a bright object was centered on the band of the remaining equatorial ring, would result in an image similar to the "double axe" image of remote antiquity, but on a somewhat smaller scale. Before 2349 BC the ecliptic dipped behind the intact Absu. Jupiter, with its gigantic coma, would at that time have been the candidate for the giant double axe imagery (known traditionally as a "labrys"), refracting its bright disk to the left and right as giant crescents. The refraction of light would be predominantly to the left and right because the structure of the rings of the Absu had a radial component (described in Egypt as "reeds"). The handle of the labrys axe, which is infrequently shown, is always too slim to be hafted to a large double-bitted axe head. The labrys is a ceremonial object of the Middle Bronze Age, circa 3200 BC to 1200 BC.

I should point out, however, that images of a star within an upturned crescent could date back to before 3147 BC. At that time the crescent at the bottom was the Sun-lighted lower half of Saturn. The star form consisted of plasma in glow mode impinging on Mercury in discrete bundles. Like the dark of the Moon during the day, the unlit portion of Saturn would not show up visually during the day. But the identification of specific planets in the *Enuma Anu Enlil* records argues against the notion that such imagery dates from before 3147 BC.

It is the same diffraction of any point-source light of a planet or star when behind the last of the equatorial rings which causes the depiction of planets as four- and eight-pointed figures. The refracted light would be at right angles to the pattern of the equatorial ring. Refracted light would radiate left and right from the primary planet behind the ring. If the ring had a granular structure the refracted light would more likely form a "halo." Photographers use filters with etched lines to achieve similar effects.

The use of the phrase "mock Moon" implies that the Chaldeans recognized that some of these images were not real. But they were signs in the sky, and had to be accounted for.

Jastrow and others allowed that the situation of Saturn, or another planet, might be seen above or below the Moon because the Moon frequently runs off the ecliptic by some 5 degrees. What has not been accounted for, of course, is to have the Moon's crescent appear on the top or bottom. That does not happen in real life except at the horizon in the tropics.

It should also be pointed out again that the last equatorial ring was red. It caused Sirius to appear as red when the axis of the Earth shifted. The ring was recalled as a rope in the sky by the lowland Maya -- "and blood ran through it." In the *Popol Vuh* it is called the "river of blood." This is the Uroboros. The tablets, on the other hand, suggest many colors.

The patterns would appear where the ecliptic crossed the ring in the sky. Because the ring was located in the south below the equatorial, these events would not happen directly at the equinox location (the intersection of the equinox and the equatorial), but would have been a month or so later in fall and earlier in spring.

... Saturn in Pisces

What needs to be answered also is why the *Enuma Anu Enlil* has so much to say about Saturn. Obviously Saturn was seen frequently, and seen in a position in the sky which caused the strange appearances of "standing in the halo of the Moon."

In fact, let us consider Saturn for a moment. Saturn moves at such a slug-like pace that it is unlikely that anything interesting would ever develop in terms of its interactions with other planets. It takes 30 years to get around the zodiac, moving only 12 degrees per year.

What would make Saturn more interesting would be the occasion for it to be seen through the last remaining band of the Absu. Then it would twinkle and sparkle and cause refracted patterns. I decided to research this topic.

The orbit of Earth had stabilized in 747 BC, and since Jupiter had last blazed in 2150 BC, it could be assumed that Saturn had also come to its final orbital position a thousand years ago. Thus an ephemeris would be accurate for the time period after 685 BC (the last change in celestial parameters). It would work if Saturn would travel through the location of the last ring in its travels along the zodiac.

Well, it turns out that in the fall of 685 BC (astronomical year), Saturn is on the zodiac at an elevation (at its highest point in the night sky) of 45 degrees at Babylon, 12.5 degrees below the equatorial. This places it within the last ring of the Absu, and thus it would be seen behind an ever-changing curtain of particulate matter, causing refractions left and right and below.

This depends, of course, on my estimates of how high in the sky the last ring of the Absu appeared. I have made some estimates of this in an appendix, on the basis of numerous reports of Sirius as colored red. The data is from the current era, and spread from AD 200 to AD 570. In each case Sirius is at a declination of 16.5 to 16.0 degrees below the equatorial. In September of 685 BC Saturn was at 12.5 degrees declination below the equatorial. A width of 4 degrees is reasonable for the remnant of the Absu.

The Moon would move through this position frequently, as would the other planets. Saturn would move away from this location in a few years, after having spent more time behind the last ring of the Absu than any other planet. Jupiter would move into this location three years after Saturn, but Jupiter had already blazed earlier, starting in July of 685 BC. The red ring is, of course, the Uroboros.

Thirty years later, in 655 BC (astronomical), Saturn would again spend some years moving through this position. And again in 625 BC. In 612 BC (in normal Eastern Mediterranean chronology) the Persians and Medes burned down Nineveh, the capital of the Assyrians. With that the astronomical records of Babylon ended.

I do not think these last two instances would have added anything to the record which was probably originally composed directly after June and July of 685 BC, for it seems 655 BC and 625 BC are much too late for a planet to still show a coma after the event of 685 BC. What we see instead is a long record all dating to the many months that Saturn had traveled through the path of the red ring in 685 BC. This would account for the many records concerning Saturn.

New Star Charts

What is also significant is how graphical star charts changed. Before 600 BC the constellations are depicted as seen from the vantage point of Earth. There was no other imaginable point of view. After 600 BC we start seeing reversed charts, and eventually globes, which require a vantage point from outside of the dome of the stars.

In time, the more subtle changes in the sky became public knowledge. It was of special significance because for most people the Earth was fixed in space, and it was the dome of the stars that revolved. The dome had been twisted and the axis had relocated. The effect of knowing that *there had been a change* in the dome of the stars would have been of much greater importance than any physical effects from the actual change. The change suggested a prime mover acting beyond the largest object in the Universe known at the time, the dome of the stars, which included all the planetary Gods. The concept of an entity which could alter the whole Universe eventually formed the basis of most religions of the world. That this had happened in one 40-day period of a summer, accompanied by planets on fire in the sky and then disappearing, was important also.

The Sibylline Star Wars

The *Sibylline Oracle Books* are texts from the first century AD, composed in Alexandria, Egypt, in Greek. The last few lines of the fifth volume, known as the "Star Wars" text, describe the blazing of Venus in 685 BC and the change in the skies -- written nearly 800 years after the event. These lines prophesied the future or impending end of the world in terms strictly coincident with events of 685 BC. It is probably the most spectacular evidence of the religious and philosophical importance of the events of 685 BC.

Oracle Books were all the rage in the period of 100 BC to AD 400. John's *Book of Revelations* is an example of one which was accepted into the canon of the New Testament. Oracle books, or collections of visions and oracles, date back to perhaps the fifth century BC. The Roman senate employed a number of persons as keepers of *Roman Oracle Books*. They were consulted whenever difficult decisions arose. [note 2]

The *Sibylline Oracle Books* are mostly Jewish in sentiment and philosophy. They use a well-established metonymical style (substituting associated names, like "Babylon" for the Roman Empire) used by the oracle of Delphi and the prophets of Israel. A close examination establishes without doubt that the descriptions can be matched against the changes in the skies in 685 BC, not only in the movement of the planet Venus, but especially in the details of how the constellations were rearranged after a new equatorial was established, and all of it presented in poetic language. Franz Xavier Kugler examined the Star Wars text in 1927. This has been expanded upon by Malcolm Lowery and Livio Stecchini in the 1970s. An analysis, additional details, and diagrams may be found in the following chapter, "The Sibylline Star Wars."

Hezekiah and Babylon

There is a well-known promise delivered by Isaiah from God to Hezekiah, king of Judah, in about 690 BC (probably in early 684 BC). Hezekiah was sick and thought he would die. Isaiah agreed, but the same day changed his mind and told Hezekiah that he would live another 15 years. As a sign, God

promised the following:

"And this shall be a sign unto thee from the Lord, that the Lord will do this thing that he hath spoken. Behold, I will bring again the shadow of the degrees, which is gone down in the sun-dial of Uzziah, ten degrees backward. So the sun returned ten degrees, by which degrees it was gone down."

-- Isaiah 38:8

It was a rash promise, but it can be explained. Velikovsky, in an unpublished document (hezekiah.htm at <http://www.varchive.org>), suggests that "degrees" should be read as such ("*maaloth in Hebrew is preferably 'degrees' and more so when applied to the sundial*"). Donald W. Patten and Samuel R. Windsor, in *The Mars-Earth Wars* (1996), however, disagree and suggest it should be taken to mean "measure." I also doubt that the "ten degrees" can be understood in terms of degrees of a circle as today. We are in an era 800 years before the development of trigonometry and the measurement of "degrees." Ussher makes the point in his comments that Judah was not even using "hours" to measure the day, even after their return, much later, from Babylonian captivity.

Patten and Windsor place the "commotion of Uzziah" in 756 BC, and the "return of the shadow" in 701 BC. De Grazia places the commotion in 747 BC (-747), as does Velikovsky. Velikovsky places the return of the shadow in the year -687, on the basis of rabbinical sources, in the evening of the demise of Sennacherib's army. The rabbinical sources, however, only point to a disturbance in the movement of the setting Sun. We know about that. In -687 Earth experienced a repulsive electric contact with Mercury, detailed in the previous chapter.

If, as Isaiah suggests, the "ten degrees" were added earlier, then it might be suggested that the Earth's axial inclination to the normal of its orbit changed from some previous value and returned to 23.5 degrees in 686 BC, with the second Earth shock. I really doubt this. But the implicit suggestion of a previous event which would have moved (lengthened) the shadow, is exactly what all the catastrophic researchers from Velikovsky to de Grazia were looking for. There was no "commotion" to account for this; the reference to Uzziah is a foil. Uzziah only built the gnomon, "the sun-dial of Uzziah."

What is most likely is that the promise by Isaiah speaks only to the measured length of the shadow at the equinox. Before 685 BC the equinox fell 15 days earlier than after 685 BC, as I have related. On this earlier equinox date, March 6th, the Sun at noon reached an angle of 58.38 degrees above the south horizon at Jerusalem (31.78 degrees north latitude). After the summer of 685 BC, the Sun was lower in the sky on the following March 6th, rising only at 52.34 degrees above the horizon, and causing the shadow to be longer by a good measure on this day.

The first full moon after the equinox had traditionally signaled the celebration of Passover (on the following Sabbath). Thus it was important to know when the equinox was. This could no longer be found from the lunar calendar as in the era before 747 BC, but it could be calculated from the number of days since the last equinox and checked against the length of the shadow on that day.

But in the first year following 685 BC, the angle of the Sun at noon on March 6th was only 52.34 degrees above the south horizon. The shadow had (as a result) lengthened by one fourth of what it was earlier. This is a considerable amount, and reason enough to call it "ten degrees" or ten measures. The Sun, on what was thought to be the day of the equinox, had "gone down" some large amount.

[note 3]

There was no event which returned the shadow to its proper length, only the realization by Isaiah that the day of the equinox had moved (remember, he had changed his mind). Isaiah's promise held good, because 15 days later, when the "new" day of the equinox was reached, it was again 58.38 degrees, or very close to it. The shadow on March 21, 684 BC, was again the same length that it was on March 6, of the previous year, for the angle of the Sun at the equinox depends only on the latitude, not on the inclination of the rotational axis of the Earth. Isaiah had experienced the change of the date of the equinox already in the fall, and could have made the simple guess from that data. Isaiah, like many of the prophets, was a competent astronomer.

What is interesting is that the sign from God also symbolized how many more years Hezekiah would live, for the difference between the old day of the equinox and the new date was 15 days. This is not mentioned in the Bible, but it is in line with the frequent acting-out by the prophets, as when Isaiah goes naked and shoeless for three years to demonstrate what would happen to the Egyptians after a three-year war with the Assyrians. *"This intimated that when that time expired, they likewise would be stripped of their clothes and go bare foot into captivity and bondage by the king of Assyria."* -- Ussher.

... Jerusalem moves 6 degrees south

Another discrepancy in the 7th century BC is noted by Donald W. Patten and Samuel R. Windsor in *The Mars-Earth Wars* (1996). The priests of the temple at Jerusalem permanently close the door through which, at an earlier time, the rays of the Sun would penetrate to the center of the temple on the morning of the equinox. Patten and Windsor conclude that Jerusalem moved south by 6 degrees of latitude in the 8th or 7th century BC, writing:

"On the basis of Kazmann's data [Raphael G. Kazmann, 'On the Orientation of Ancient Temples and Other Anomalies' (Aeon, 1990)], the conclusion here is that the latitude of Jerusalem slipped south by a total of 6 degrees between 965 B.C.E. and 701 B.C.E. During this time span there were five Mars flybys."

The date of 701 BC is, of course, from Patten and Windsor's narrative. The date of 701 BC marks, for them, the date when the length of the year changed -- which every other revisionist cosmologist has assigned to 747 BC. Patten and Windsor therefore conclude that the temple doors were closed after a change in the length of the year. The first temple, attributed to Solomon was oriented to face the northwest Atlantic. The light of the Sun was cast into the interior with a set of mirrors.

"If this interpretation of Kazmann's data is correct, the latitude of Jerusalem shifted southward by some 400 miles. Simultaneously the North Pole (spin axis) shifted some 400 miles in the Arctic Basin. If so, the North Pole net shift was away from Scandinavia and toward Alaska, the Yukon, British Columbia (and Seattle). As Jerusalem shifted southward 6 degrees, or 410 miles, Seattle, Vancouver, Anchorage, Fairbanks and Point Barrow shifted northward a similar distance and their climates became cooler."

I frankly cannot follow how Patten and Windsor arrive at the difference of 6 degrees in latitude. Moving a location south (or north) does not change the shadows at the equinox or the location of the rising Sun. The first temple at Jerusalem had an axis located 6 degrees west of north, pointing to the

North Atlantic -- to the much earlier location of the plasma contact from Saturn.

Patten and Windsor fail to note that the temple built by Solomon was rebuilt in 516 (after the Jews' return from Babylon) but oriented to the true north-south and east-west cardinal directions. I might suggest instead that the sudden displacement of the equinox by 15 days in 685 BC and the change in the polar axis might have been an influence in correcting the notion of orientation which was already 2000 year out of date in Solomon's time.

... the latitude of Babylon

It was noted in antiquity that apparently the latitude of Babylon had shifted by about 2.5 degrees south, from 34.95 degrees north latitude to 32.55 degrees latitude, some time after 700 BC or 650 BC. That there were two values for the geographic location, that is, the latitude, of Babylon, which could be derived from recorded measurements of the longest day at midsummer, was noted by Ptolemy (circa AD 150), Arzachel (circa AD 1050), Kepler (circa AD 1600), and Kugler (circa AD 1910). The records date from 700 to 650 BC. Kugler worked from original sources.

However, there was no change in latitude; it was an inadvertent misreading at the time the inclination of the Earth's axis changed.

In antiquity the "latitude" was expressed as the ratio of the longest day to the shortest day, and rather poorly integrated into notions of the angle of the Sun and the inclination of the Earth's axis. Babylon's "earlier" recorded ratio of longest day to shortest day was 1.50.

We cannot solve this problem with trigonometry as we know it, for trigonometry dates from about AD 300. The Babylonians, similarly, would not have used trigonometry.

The latitude problem has remained unexplained for over 2000 years now. What I will suggest as a solution is that the ratio of 1.50 was erroneously derived. The following is based on how the Babylonians would most likely have proceeded.

The first date after July 25, 685 BC, that new values would be measured, would be the winter solstice. This is easily found, since the Sun would seem to be standing still, that is, not advancing along the horizon, for two to four days.

The length of the day was 9 hours and 50 minutes. Taken into a ratio of the longest day at the previous summer solstice (at that time on June 6th, equivalent to June 21 of today), 14 hours and 52 minutes, which had occurred before the change in the heavens, this would yield 1:51 -- and was recorded.

---- Babylon, ratio of longest day to shortest day ----				
axial incl	longest day	shortest day	ratio	notes
30.0 deg	14:52 hrs	9:06 hrs	1.63	prior
23.5	14:08	9:50	1.44	today

measured Dec 685, compared with Jun 685:				
30.0 deg	14:52 hrs			Jun 685 BC
23.5		9:50 h		Dec 685 BC
error	14:52	9:50	1.51	in error

measured Jun 684, compared with Dec 685:				
23.5	14:08			Jun 684 BC
23.5		9:50 h		Dec 685 BC
correct	14:08	9:50	1.44	correct

Six months later a new ratio of 1.44 was computed, based on the new lengths of both the winter and summer solstice.

Had the Babylonians known trigonometry, they would have realized that the latitude can be found as the complement of the height of the angle of the Sun above the south horizon at the equinox. Without this, the Babylonians had to use the solstices to properly measure the shadow.

Considering that the Babylonians were deeply involved in their revised mathematics of lunar eclipse predictions, and additionally kept multiple records of the locations of the planets, even though some were obviously outdated, it seems reasonable that an erroneous value for the ratio of the longest day to the shortest day was also not discarded. That was a mistake.

Whatever happened to the ratio of 1.63 recorded before 685 BC? It was based on a polar axis tilted at 30 degrees, taken into a ratio based on the current axial inclination. It is not just wrong, but even useless. This ratio would have suggested that Babylon was located at 40.3 degrees north, a difference of 7.75 degrees, placing Babylon in the Caucasus mountains between the Black Sea and the Caspian. No one since Babylonian days would have believed that, and if this value had been recorded it would have been held as totally erroneous. Even the Babylonians of the seventh century BC would have discarded the data.

The additional erroneously derived ratio of 1.51 was kept because it looked to be nearly correct. The Sun had moved in 685 BC, that was certain. Who was to tell how things had changed with the Earth and the stars. Pliny had described it as "a slackening of creation," as if the Earth had slipped south.

... the Babylonians visit Hezekiah

The Moon had changed its period after 747 BC, to 29-1/2 days, and thus there were now slightly more than 12-1/3 lunar months in the year, since the year had also lengthened. This would cause no end of problems, for the lunar months no longer coincided comfortably with the number of days in the solar year. But after the summer of 685, there was the additional problem that the equinox had shifted.

As a comment on cooperative calendrical efforts in the Middle East, it should be noted that the Babylonians (Chaldeans), who had apparently celebrated the new year at the spring equinox based solely on the fact that this coincided before 747 BC with a new Moon, were now at a loss to figure out the date of the equinox, especially since the phases of the Moon now showed up at arbitrary times throughout the year.

Babylon sent observers to Jerusalem, for the Israelites knew the day of the equinox, since Passover was celebrated on the Sabbath following the first full Moon after the spring equinox. Jerusalem knew how to exactly find the day of the equinox, by counting days, and by measuring the shadow of a gnomon. The visit by the Babylonians is recorded in the Bible at 2 Chronicles 32:31.

William Whiston, translator (in AD 1737) of Josephus's *The Antiquity of the Jews* (AD 93), writes in a footnote, about the regression of the shadow of a gnomon by ten steps under Hezekiah (in 685 BC):

"... this wonderful signal was not, it seems, peculiar to Judea, but either seen, or at least heard of, at Babylon also, as appears by '2-Chronicles' 32:31, where we learn that the Babylonian ambassadors were sent to Hezekiah, among other things, to inquire of the wonder that was done in the land."

Ussher records this as:

"Now in the beginning of the 15th year of Hezekiah's reign, Merodach, or Berodach Baladan, the son Baladan, the king of Babylon, sent messengers with presents to him. They wanted to know the reason for the miraculous retrogradation of the sun which happened in the world."

The "retrogradation" is correct nomenclature. The Sun normally advances in the sky further east each following day, and further into the series of zodiac houses. What had happened is that the Sun had backed up half of a zodiac house, as noted by the end of the year 685 BC. We have to recognize (as has already been demonstrated in this text) that the prophets of Israel were competent astronomers. This is again demonstrated here, where the foremost astronomers of the whole Middle East come to Jerusalem to learn a few things.

Philosophy, Religion, Science

Venus lost its tail in 685 BC, and Mars no longer came close to Earth after 670 BC. Mercury also was not seen again anywhere near Earth. The coma of Jupiter had probably disappeared by 650 BC. The blackboard in the sky, which had taught mankind all of its conduct, had been erased. The Gods were gone. When Xerxes, in about 484 BC, entered Babylon to destroy its religious hold on the region, he found the statue of Marduk in a coffin. He melted it down.

Despite some continued local "Ignis Coelis" (fire falling from the skies), continued sightings of meteors, which slowly reduced in frequency over the next 1000 years, and the earthquakes which continued for hundreds of years, the lessons from the Gods had come to an end. In the sky only the stars and pinpoints of planets were to be found. The band of the ecliptic continued to glow like a highway until AD 1840. In the 20th-century, references to the "path of the Gods" are identified with the Milky Way instead (to confound "ancient legends" even further).



[Image: A 19th century graphic in the style of a medieval illustration by Camille Flammarion (1888); looking past the dome of the stars. Rather than finding God beyond the dome of the stars, the viewer is confronted with an endless expanse of additional wheels and gears -- the mechanics of the Universe.]

Yet plasma contacts between distant planets persisted for a long time after 670 BC. There are dozens of recorded observations in China, Arabia, and medieval Europe. Charles Raspil paraphrases an incident recorded in China in the 10th century AD, which caught my eye:

"On the morning of March 18, [AD] 904, Venus was observed near the Pleiades blazing like fire. The next morning, to observers, Venus appeared to have developed three horns, somewhat resembling a flower, and then began to tremble and shake.

-- Charles Raspil *Planetary observations of the T'ang* (1994) [note 4]

Mars and Jupiter are also noted for anomalous behavior, but many of the observations find the planets in the wrong location, and thus the anomalies can be attributed to errors in identification. Strange celestial events were frequently noted elsewhere also, as recounted in European records of "fire falling from heaven." But humanity was no longer confronted with large globes looming threateningly above the Earth during the day or night. After 685 BC the planets kept their distance.

The planets, which had previously had been seen as the Gods -- Saturn, Jupiter, and Mars -- had been identified and tracked as they receded in the sky after 3147 BC and after 685 BC. But Venus was not added to the "four planets of antiquity" until after 600 BC -- primarily because of the strange path taken by Venus in the sky. And, in fact, the clear identification of Isis, Horus, and Thoth with the planets Venus, Mars, and Mercury often remained uncertain during the prior period when the Gods raged across the skies.

They were often misnamed and misidentified, confused with each other, or associated with the names of differing Gods and Goddesses (and stars also). This was to be expected since the planets were on unpredictable orbits, disappearing towards the Sun or deep into the night sky, and then appearing inexplicably close to Earth. As long as that happened, and as long as no "model" of the Universe existed, the planets retained their anthropomorphic qualities. A science of astronomy, based on the

regular traversal of wandering specks across the night sky, did not develop until after the 7th century BC. [note 5]

The suddenly cleared skies caused a second immense change in humanity's perspective on the world, not unlike the change in 3147 BC when the Gods departed, but without the attendant catastrophic physical trauma. Whereas for 10,000 years everything had been ordered by the willful and unpredictable Gods, now there was nothing to base life's decisions on.

The New Religions

We can readily trace the development of all of the modern religions to the period following 685 BC, although many have much deeper roots.

... Zoroastrianism

In the seventh and sixth century BC, Zarathustra (born in 628 BC, a date derived in antiquity), a Persian, develops a new religion, Zoroastrianism, as a composite of Vedic and Persian religious practices. He retains the essential monotheism, equating the deity Mazda or Ahura-mazda with fire, and adds prohibitions against human and animal sacrifices. He is also the first to suggest the devil as a separate God, forever in conflict with Mazda for control of the world. Zoroastrianism becomes the official religion of the Persians. It is significant not only for its monotheism, but also for the change of worship from anthropomorphic celestial deities to a worship of a conceptual God, here expressed as the element of fire. Philosophically, Zoroastrianism introduced the concept of free will. It seems almost certain that Zoroastrianism had been influenced by the fiery battle of Venus and the Sun.

... Mithraism

One of the (later) minor deities of Persian Zoroastrianism, Mithra (which translates as "contract"), becomes the God of a new religion and contract between humans and a greater God. The concept of a covenant between this new, greater, and impersonal God is offered as a promise of hope, something which will pervade all the new religions except Taoism. [note 6]

Mithraism was first noted in Parthia in 272 BC and became well established in Roman regions of Europe and North Africa by the first century AD. In a few hundred years, Mithraism spread far into Western Europe as a self-contained religion. It was a forerunner of Christianity, especially in the idea of a "new contract" between God and mankind. In the Roman cult of Mithraism, the name "Mithras" is understood to mean "mediator." Christ preached a new contract with God also, under the metaphor of God as a shepherd.

Mithraism takes on the iconography of a bull (the constellation Taurus) slain by the God Mithras (as represented by the constellation Perseus, standing above Taurus in the sky), and clearly includes a number of other constellations in the imagery. These are constellations close to the equatorial, not the ecliptic. All represent animals which one by one follow Taurus in appearing above the eastern horizon during the summer night skies.

"In Porphyry [philosopher, 3rd century AD], for example, we find recorded a tradition that the cave which is depicted in the tauroctony and which the underground Mithraic temples were designed to imitate was intended to be 'an image of the cosmos.'"

-- David Ulansey *The Origins of the Mithraic Mysteries* (1989)

The cave as a metaphor for the cosmos is an interesting concept, for this can be extended to having a God standing outside of the cave, outside the cosmos. We have no clear idea what the real meaning of the Mithraic iconography is, although it could be guessed that it expressed a new order for humanity and the Universe: the old gods were dead, the Son of the Sun (Venus in 685 BC) had slain the horned bull (Taurus) associated with the former Gods (and the prior start of the year), and had moved the whole sky to a new starting point for spring -- to the constellation of the Ram. The understanding was that the start of a new world order had been signaled with a sign from a God who exceeded in power all of the old deities, a God who stood outside of the dome of the stars and planets and suddenly moved it one day to a new location. [note 7]

We need to add another set of twins to the list developed in the previous chapter. The iconography of Mithraism always includes twin boys (known as Cautes and Cautopates) on the left and right of Mithra and on each side of a surrounding depiction of the zodiac. The boys are holding torches, one holds his torch high and one with his torch pointed down. Both boys have their legs crossed, each with a different leg in the front. Others have noted that the crossed legs might represent the vernal and autumnal equinox -- the St Andrew's cross of the red ring of the equatorial and the yellow band of the ecliptic, as I had also noted for Mesoamerica. In some cases the crossed legs correspond correctly to the the vernal and autumnal equinox, in other cases these are reversed.

I would also suggest that the torch held down and the torch held high represent the winter and summer solstice of the Sun respectively after the fall and spring equinox. The torch held down represents the act of relighting the torch at the winter solstice (which is normally done by grinding the lighted end against the ground). The torch held high represents the full light of the summer solstice (they might represent the equinoxes instead of the solstices). [note 8]

... Taoism

In China, Lao-tse (604-531 BC) develops the philosophy of Taoism. Lao-tse's book, the *Tao-te*, proposes to explain "the change of the path." The path, which could metaphorically be taken as "the path of life," is clearly also the path of the planets. Chinese cosmology had already advanced to imagine the Earth (although conceived of as a flat square of land) surrounded by a rotating dome of the stars. The shift in the heavens in 685 BC must have had a huge impact on the thinking of the Chinese. It was as if some giant external hand had suddenly twisted the dome of the stars. This seemed to have curtailed any further removal of the remaining "mystical" elements from religion and cosmology which had been initiated by the Chou. The power of a "heaven" was retained as a certainty, as an external force which would continue to dominate imperial politics, reinforced by later Confucian philosophy. [note 9]

We have to understand the "new religions" as having the same purpose as the "new philosophies" (discussed further below). Both sought a moral order independent of the older Gods, and both were meant to democratize thought and religious practices, in effect taking these functions away from a

priestly cast. The coincidence of dates is as follows:

- Zoroaster (Zarathustra, Northeastern Persia, 628-?? BC), of the tribe of the Magi, developed Zoroastrianism (Mazdaism). Zoroaster understood the events of 685 BC as a battle between good and evil, with good eventually winning the battle, but not without continued support from the people. The Persian kings hired the Magi to officiate at their ceremonies and sacrifices. The monotheism of Mazdaism influenced Judaism during the Babylonian captivity of the Jews (597-536 BC), and spread throughout the eastern portion of the Middle East and into Arabia. It gave rise to Mithraism by perhaps 300 BC, and was a very important model for Christianity and, at a much later date, for Islam. [note 10]
- Lao-tse (China, 604-531 BC) devised the philosophy of Taoism. His existence may be in doubt, but that would serve his philosophy of restraint well. Taoism was discussed above.
- Confucius (China, 551-479 BC) extended to everyone the worship services originally only allowed to the emperor.
- Siddhartha Gautama, the Buddha, (India, 563-483 BC) founded Buddhism, one of the major influences in the reformation of Hinduism, and later a major philosophical influence in China. About the teachings of the Buddha, H. G. Wells, writes in *The Outline of History* (1961), "*It is beyond all dispute the achievement of one of the most penetrating intelligences the world has ever known.*"
- Vardhamana Mahavira (India, ??-527 BC) was the founder of Jainism, with ideas partially derived from Hinduism and Buddhism.
- The mystery religions of Anatolia and Greece (the worship of Demeter, Orpheus, Dionysus) all seem to date to the 6th century BC, although some elements, as, for example, the Eleusinian rites of Demeter, may be much older and more primitive. [note 11]
- Changes in Mesoamerica are harder (if not impossible) to trace. The Olmecs seemed to have worshiped (or feared) Mars in the 8th and 7th century BC (and Venus earlier). Elements of their culture resurface in Central Mexico, but with the addition of the cult of Quetzalcoatl, the sacrificed Venus, and a cult of the dead -- actually a cult of the afterlife. New alignments to the setting or rising sun on or about August 12 become a feature of ceremonial centers after 600 BC. The definitive site was the city of Teotihuacan -- "the place where men become Gods." See the chapter "Olmec Site Alignments."

The new religions were testaments to hope -- hope for a good life on Earth, hope for the abatement of evil, hope for an afterlife, hope for union with God, hope for victory of a nation, hope for the conquest of others. The specifics vary with the politics and philosophy of various peoples. The Christians hoped for the return of their savior. Their hope lasted 1200 years. The Mexicans and Maya hoped for the return of Quetzalcoatl for 2200 years. The promise of a redemption resulting in life after death is almost universal.

I should also point out that the older Gods were not simply put aside. From a look at the history of republican and imperial Rome it becomes obvious that, certainly at the official level, the honors and ceremonies extended to the elder Gods continued unabated for the next thousand years. But it should also be noted that no new Gods were added. As Alfred de Grazia wrote:

"No new sky god has been 'invented' in any part of the world since the Martian age [after circa 680 BC]. ... Nor did the Teutonic peoples invent new gods, try as they might, after the 'Ragnarok' or 'Götterdämmerung.' Nor did a new sky god come out of India, China, or America."

"Whence one concludes that 'real gods' cannot be 'invented' by the human mind as a pastime, or as a cold decision. Further, the abstract God of the Jews and of Christians and Muslims, and the abstract Heaven of the Chinese, are gods of philosophy. Insofar as a tangible presence is given to them, that presence becomes manifest in the behavior, appearances, visitations, rituals and iconography of the ancient sky gods and their heavenly hosts."

Philosophy and Science

Within 100 years after 685 BC, we see the simultaneous rise of philosophy in China, India, Mesopotamia (Chaldea), Israel, and Greece. The coincidence of start-up dates is amazing. The methods of building a philosophical system differ, but everywhere the systems include a sudden interest in history and in physics. About the sudden interest in materials and basic concepts, Kelley L. Ross writes:

"The multiple points of similarity between thought of Greece, India, and China, evident in the simplest terms in their respective treatment of the physical elements, cannot be accounted for by mutual influence, which does not seem to have existed at the earliest period." [note 12]

China will retain the Yin and Yang and the "five elements" of remote antiquity, and build onto this a political and moral philosophy. Chaldea and India devise a science of astrology. Israel collates the historical facts for the Bible and adds the rituals from antiquity. The Greeks start investigations which will form the core of Western physics, and write the first histories. [note 13]

About the period of 600 to 500 BC, Irving Wolfe wrote, in 1997:

"[There is] evidence for what I call a 'Kultursturz' or cultural crisis in which a large number of cultural elements underwent quick and sharp change within the same short period of time. These include the appearance of secular as opposed to strictly religious art, a host of new religions of a new type, new philosophies of a new type, writing, dynastic upheavals, the quick upsurge and removal of several tyrannical regimes, urbanism, new patterns of consciousness, behavior, and dreaming, new types of social organization, vast pan-Greek ritualistic athletic games, the institution of democracy and the use of money. All of these elements are totally different in spirit from those of the previous (Bronze Age) cultures."

-- Irving Wolfe, "The 'Kultursturz' At The Bronze Age / Iron Age Boundary" *Natural Catastrophes during Bronze Age Civilizations*, SIS Conference (1997).

Wolfe continues with:

"If all of these cultural revolutions can be correlated chronologically among themselves and to scientific evidence for similar upheavals well documented in the geological, archaeological and climatological record, then we have before us the outline of a global natural event which not

only ended one historical era, but led to the distinctive cultural characteristics of our modern age. After all, we are the children of this period of upheaval."

The "evidence for similar [geological] upheavals" clearly exists as part of the 8th and 7th century BC, preceding the changes of the 7th and 6th century BC which Wolfe speaks of. But the one single celestial event of 685 BC, which became the definitive opening of the new human cultural era, caused no physical upheavals.

The people of Mesoamerica also acknowledged the change in milieu, even though the written records attesting to this do not appear until nearly 2000 years later. The death of Quetzalcoatl is a concluding event in Mesoamerica, as it was for people elsewhere in the world, and no new celestial Gods are introduced after the 7th century BC. It is at this time, in fact, that we see the demise of the Olmecs and the rise of other Central American civilizations, and a Mesoamerican "physics" which becomes a system of control over the spiritual world, not unlike that of India and Babylonia. An intense interest in history also develops, soon aided with a fully developed script (after 600 BC) used to elucidate the much older graphical records painted on bark books. The interest in history at this time was worldwide.

"And here ends that interval of time which is termed mythological. From this time on history begins."

-- Varro, first century BC.

Varro is actually speaking about history after the 8th century BC, in reference to 776 BC, the first Olympiad. But prior to Varro Greek chronographers had already divided history up into two eras, the "mythological" and the "historical." The year 747 BC was the dividing line between the two eras. [note 14]

By the first century AD, historians are convinced that there is no sensible history more than a few centuries before their own time. Varro and other historians had never seen any of the wonders that the ancients talked about, nor had Herodotus in 400 BC. They considered the visits of Athena, streaking through the day skies with her long hair, or the attacks on the Earth by Ares, the bloodied stormer of walls, as "myths" concocted by their ancestors. Their attitude seems entirely modern to us. In the Greek city of Miletos, a new school of philosophy sought to explain the world in terms of what was observed rather than basing explanations on the testimony of the ancients. [note 15]

"Human beings are distributed all around the Earth and stand with their feet pointing to each other"

-- Pliny, first century AD

Pliny's observation is paralleled by Greeks, Mesopotamians, Indians, and Chinese of the same era. "Everywhere upon the globe of the earth, men think their own place to be topmost," reads the Hindu *Suyra Siddhanta* of about the same date. Many people of this era knew that the Earth was a globe which "hangs suspended and does not fall," as Pliny wrote. Chaldeans knew that eclipses of the Moon were caused by the Earth's shadow, and could predict them. Aristarchus of Samos knew the Earth traveled around the Sun. Hipparchus (129 BC) calculated the minute annual shift in the Earth's equinox. Eratosthenes correctly found the circumference of the Earth. [note 16]

I am using these examples of a new physics of the Solar System to demonstrate that a watershed had been reached in subjective consciousness, which over the course of a few hundred years expands to an ability to incorporate observations into narratized mental spaces and explore them profitably. This particular model -- representing the Earth as a globe suspended in space -- could only be seen in the imagination.

The same is seen in China and India at about the same time, where natural history develops into "sciences," which depend on imagined mental spaces congruent with reality as observed. To explain everything, without reference to remote antiquity, it was first necessary to describe the physical world.

Not the same can be said for Mesoamerica at first glance, with its detailed congruence of real-world and spiritual-world interactions, based perhaps too much yet on the celestial observations of remote antiquity for our taste. But there was also a very different attitude toward the past. The people of Mesoamerica had complete illustrated records of the past, extending back 40,000 years, and in a uniform graphical format. Pictures don't lie; the Olmecs, Mexicans, Guatemalans, and Maya believed in the past -- unlike the people of the Mediterranean, who were always suspicious of the tales and retellings of their forebears. I think also that texts were only added to the graphic books after about 600 BC.

Considered in detail, the thought system of the Maya exhibits the same rationality in navigating this intricately detailed imagined spiritual space. It does not involve "facts" as we understand them, that is, events placed in a continuity of time and a contiguity with other observations, but is instead totally based on firmly believed interactions between the realms of the real and the spiritual. Yet it represents a way of thinking which is far removed from mere acceptance of the world. The Mesoamerican "philosophy" also dates (I suspect) to after 600 BC. It was widespread and uniform when the Spanish arrived. The histories written after the time of the Spanish of the ball-playing twins, written 2200 years after the events (and the surviving celebrations which still exist today), point to the stability of the underlying philosophy.

Some of the new science went awry, of course. The Babylonians (Chaldeans) had made astronomical observations dating back perhaps to 2300 BC. But only in the seventh century BC is this seriously developed into a "science" of astrology. This effort was a giant leap into an arena of correlation between observed celestial and earthly events which the same people had been incapable of even imagining during the previous 2000 years. What made this particular "science" valid to them was the assumption that the planets, identified with the Gods of old, still regulated the lives of men and controlled events on Earth, just as the Gods had always done.

Holding On to the Past

The ultimate effort everywhere was to explain mankind's existence and formulate a code of proper behavior. By 500 to 400 BC the Greeks had reached an intellectual level which is completely modern to us. And yet, at times the past peeks through. The same philosophers who could verbally extract the roots of quadratic equations, held fast to omens and espoused the prophesies of oracles with certitude.

The prophetess at Delphi, in effect, ruled the whole of the Greek political world for 1000 years with her instantaneous answers to questions about colonization, leaders, laws, enemies, and personal fortunes. Thucydides, writing about the Peloponnesian Wars (430 -- 404 BC), in detailing all the human failings in the course of events, never fails to append his histories with the pronouncements of Delphi to show how the prophesies had been accomplished. The *New Testament* uses prophesies in the same manner, as

authentication. Plato, in his otherwise completely cynical writings, holds the Delphic Oracle in high esteem.

Omens, prophecy, and foretelling of the future remained very serious practices lasting well into the current era. (The *Sibylline Oracle Books* were still in circulation in the 16th century AD.) The concept of "free will" was developed in Greece in classical times (400 BC), but not widely accepted for another 2000 years. The Greek tragedies hold that "fate" runs the lives of men, resulting in plotlines often completely inexplicable to us as modern readers. The idea of "chance happening" does not take hold in Europe until well after the Middle Ages. [note 17]

The past maintained a particular hold on the people of South America and Mesoamerica. For Mesoamerica, the observation of Venus remained a primary theological obsession, especially for the Maya, who record yearly corrections to a base calculation of the location of Venus which comes closer in estimating its movements than the Europeans would be able to do for 200 years after they "discover" the Maya.

For the Aztec, the pacification of the Gods remains at the center of life. The Aztecs, the people of Mars, had successfully kept cosmic misfortune at bay, for hundreds of years, at the cost of many thousands of lives, when the Spanish arrived in AD 1492. Even in the last battle with Cortez's soldiers over possession of the city of Tenochtitlan, the Aztec warriors take time out from battle to drag captured Spanish soldiers to the top platform of the temple of Huitzilopochtli to rip out their hearts. The sacrifices were necessary measures as long as the return of the unpredictable Gods remained a possibility.

The Presence of God

It seems almost unbelievable that the altered night skies, and especially the rotation of the dome of the stars, would have the effect that it did in generating a half dozen new religions, initiating an historical awareness, and be the genesis of the study of physics. It is even more astounding to see these changes happening worldwide and at almost the same time -- in Babylonia, Greece, India, China, and Mesoamerica. The simultaneity of the interests in these topics is amazing, especially considering the lack of cultural contacts. This has been remarked upon by others.

If you look for the history of any of the Greek cities, or the nations of the Middle East, or China, you will see that in most instances history cannot be traced back before 600 or 700 BC. Everything disappears into legends. It is as if the world suddenly woke up, and abstract thought was first allowed after 600 BC.

I should point out, however, that the changes in outlook did not come easily. Plutarch, writing in the first century AD, tells of Anaxagoras, after about 500 BC:

"Anaxagoras was the first to put in writing, most clearly and most courageously of all men, the explanation of the moon's illumination and darkness. His account was not common property, but was a secret, current among only a few. For in those days they refused to tolerate the physicists and stargazers, as they were called, who presumed to fritter away the deity into unreasoning causes, blind forces, and necessary properties."

"Anaxagoras was accused of impiety and sentenced [to death] for holding that the sun is a red-hot stone and the moon is of earthly nature. This was in disagreement with the view that these luminaries were deities."

By 650 BC we have a society of vagabonds and inland survivors in Greece. The coastal people had been decimated with the repeated strikes of Mars. The up-land goatherd survivors had no earthly history of more than one or two generations, no genealogy except that which linked to mythical beings, and no homes. For the mainland Greeks and those of Asia Minor, the devastations of the 8th and 7th centuries BC had made a complete break with the expectations of the past and with the conservative attitudes of the past. The time and the place were ripe for something new (de Grazia).

The fact is that far-flung regions of the world all simultaneously came to the same conclusions about the universe and the world. This suggests the possibility of something global being the cause of the new sciences, philosophies, and inquiries.

Two recent events are possibilities. The earlier instance of the "Tower of Babel" event was in 2150 BC. This was the flaming of Jupiter. A second "Tower of Babel" event is dated to 686 BC (astronomical), and seems to be universally attributed to Mercury. These later "Tower of Babel" stories are worldwide, which also suggests that the event was recent, and not 1500 years earlier. But in both cases the "event" preceded a change in the attitude and awareness of humans. The fire of Jupiter in 2150 BC precedes a jump in awareness of around 2000 BC. This date can be understood as the time when the first historical interest seems to have developed.

But in terms of a timetable for the development of philosophy, science, and religion, the date of circa 2000 BC is far too early. The electrical contact by Mercury in 686 BC happened directly before the blazing of Venus and Mercury in 685 BC. Mercury, I should point out again, is the only inner planet (besides Earth) with a magnetic field, although minor. It might be coincidence but this also preceded a jump in awareness for humans.

The other thing which stands out, besides the "Tower of Babel" event, is a change in the size of the plasmasphere of the Earth. This can be concluded from the precession of the equinoxes. Before 747 BC there was no precession of the equinoxes. This is certainly to be recognized from the multitude of data which points to the fact that the same constellations were held to be the centerpoints of the spring and fall equinox -- Taurus and Scorpio -- for the time before 685 BC, which can be extended to 747 BC. Precession was only noted after 400 BC in Asia Minor and after AD 300 in China when it became obvious. To notice the precession of the equinox requires the accumulation of data for more than a hundred years, since the rate is about one degree in a hundred years.

The lack of precession before 747 BC means that the Moon did not exit and reenter the Earth's plasmasphere in traveling "around" the Earth. Today the plasmasphere of the Earth has a dimension of 10 to 20 Earth diameters on the Sun side, thus 80,000 to 160,000 miles. The Moon today remains within this for only part of its orbit. The Moon moves outside the plasmasphere when it travels to the Sun-side of Earth, because the radius of the Moon's orbit is 250,000 miles, and the plasmasphere of the Earth is currently at best only 160,000 miles. That means that before 747 BC the plasmasphere of the Earth must have had a dimension of some 30 Earth diameters on the Sun-side -- 240,000 miles -- large enough to keep the Moon wholly within the Earth's plasmasphere.

It is not the Moon, however, or the precession of the equinoxes, that changed our behavior. These changes are much too slow to account for the sudden changed attitudes and interests after about 600 BC. What I am suggesting here is that the Earth would have been at a much different electric potential with respect to the surrounding space of the Sun. That probably happened after 685 BC. If the Earth's plasmasphere shrunk after 685 BC, then it was because the electric field of the Sun had dropped in intensity. And this in turn might have been the consequence of Mercury moving to an orbit close to the Sun.

... lowered potential

We cannot neglect that the Sun changed its output for 40 days in 685 BC, or the fact that Jupiter released a thunderbolt. But these were temporary events. We could assume that it represented an adjustment in the flow of plasma from the Sun (the solar wind) after the change in orbit of Mercury in 686 BC. In 686 BC Mercury for the first time assumed an orbit entirely within the orbit of Venus. This must have caused a radical change in the conductive path for the solar wind or at least a change in the electric field at the exterior to the Sun. Certainly the Earth also made an adjustment in its electric parameters if Mercury, Venus, and Jupiter did so.

There might be effects on the physiology of humans resulting from a voltage difference from head to toe, but I doubt it, for this is but a small fraction of the voltage difference from ground to the stratosphere or the ionosphere, or certainly to the location of the double layer of the Earth's plasmasphere.

The only thing I can suggest is that the era before 685 BC would have experienced much more active electrical interactions between the upper atmosphere (or ionosphere) and ground level -- in terms of thunderbolts, Saint Elmo's Fire, but especially in terms of things like ball lightning. I am suggesting this last because the psychological effects are still experienced today, even though ball lightning occurs only infrequently.

I will start with a note on ball lightning as a minor version of the larger crop circles. There are similarities in that both are manifestations of moving plasma. Ball lightning is an example of a spherical plasmoid, which is self-sustaining, at least for a lifespan measured in seconds or minutes. And then they disappear. But this is actually most likely a mode change for ball lightning. The disappearance would make the original grapefruit-size ball plasmoid in glow mode into an invisible sphere in dark mode perhaps ten or twenty feet (3 to 7 meters) in diameter or larger. This could easily engulf a nearby human, resulting in a feeling of "presence" of another being (as what also happens when we sense another human or animal nearby).

Various people have expressed everything from nausea to terror in the presence of extinguished (dark mode) ball lightning but especially in crop circles. My one-time experience after extinction of nearby ball lightning was of terror, being certain that there was "somebody else" near me -- in the middle of the night, no less. As others have said, once you meet up with ball lightning, you never forget. Typically perhaps, I think people will localize such an experience (I did), so that it becomes associated with a place and a condition. Specific to crop circles, BLT Research (Internet) reports:

"A wide range of anecdotal reports exists of the effects on people. These reports have not been scientifically evaluated, but it seems clear that many people experience unusual physical effects in some crop formations -- and most often when the crop circles are relatively new. These effects

range from the unpleasant (splitting' headaches, dizziness, disorientation, heart palpitations, a sense of 'dread') to the euphoric (a strong sense of 'peace,' a feeling of joy, a sense of 'oneness,' and a feeling of love)... Many people have also experienced the sensation of a presence of some sort -- other than their own, and invisible -- while inside crop circles."

"It is easy, perhaps, to dismiss such reports as being due to some sort of hysteria or over-excitement, and there seems to be no evidence of long-term effect to either people or animals. However, the fact is that a large number of field personnel who have spent considerable time in the formations, as well as some of the more casual visitors, have experienced one or several of these effects in crop circles all over the world. The fact that most of these experiences are reported in newly formed crop circles suggests there may be a remnant energy still present at some of these sites, to which at least some people are sensitive. It is most interesting that these effects do not seem to be present at all crop circles, and that, even when some people are affected in a particular event, other visitors will be unaware of anything unusual at all." -- BLT Research, <http://www.bltresearch.com> [note 18]

Because of the life-long recurring dread or feeling of potential contact for anyone who experienced this condition, I think it would take a generation or two of people who never experienced this, before we would see the intellectual effort to summarily dismiss the tales told by their parents and grandparents. Agnosticism fills the void of missing evidence -- the missing experiences your grandparents told you about. And agnosticism then searches elsewhere for meaning. That certainly was the case for the Greeks, and seems to have been the case in China and India and Israel. Nothing like it in Egypt, of course.

What was missing then, after 685 BC, was the potent and palpable presence of God. That was the difference, I think, between the period before 685 BC and the period afterward.

I started this text to suggest that the effect of lowering the Earth's negative charge (or specifically, the Earth's potential) after 685 BC, suddenly made us humans much smarter -- philosophically, scientifically, and probably religiously also. We suddenly see a vast outpouring of literature, philosophical speculation, historical inquiry, all starting within two generations after 685 BC. The connection between 685 BC and the start of philosophy and physics is startling. There is a gap of two generations -- the time it would take for grand children to no longer believe in the old tales. But it must have taken more than just a generational difference, for religious traditions die hard. This change was sudden and radical. What I will suggest, therefore, is that the changes that were experienced were entirely due to the cessation of the effects of ball lightning and allied forms of plasma transfers between the Earth and the upper atmosphere and I will suggest "crop circles" instead of ball lightning as the prime agent.

... crop circles and ball lightning

The following is an example of very powerful ball lightning:

"In May or June of 1988 or 1989 around 2 P.M. CEST, Mr. Alois Fuehrer, a farmer of 38 years from Jungschlag, a small village South of Ottenschlag, Northern Lower Austria, 850 meters above sea level, returned early from fieldwork because a heavy thunderstorm moved in from the north-west. Fuehrer stood in the open on a wooden plank at the rear of the diesel tractor driven by his father."

"The vehicle had passed the last Ottenschlag houses southbound, when he noticed a falling object. It was round, 20 centimeters across, and 'seemed to come down like a toy balloon', vertical, soundless, without rotation. It was brilliant white, a steady light, and had 'something like a smoke trail'. Only 20 to 30 meters to the right of the tractor and of the road, after 4 to 6 seconds, the object hit the surface of a green summer barley field, flashed up and 'exploded with a loud, very high pitched bang.' Mr. Fuehrer said 'this was no thunder,' and noticed no heat or pressure wave. However, what he felt caused panic -- a tingling, and his hairs stood on end on his head, neck, even on his hands. He urged his father: 'Get out of here, the next one will kill us!', who also felt the electrostatic effect in the driver's cab. The diesel tractor continued to function normally."

"Arriving home, the Fuehrers still wondered what had happened and they went back to have a look on the same evening. They found a circular patch about 6 meters [18 feet] across in the impact area where green barley plants had been reduced to ashes and smoke, 'as with a cutting torch.' The burn effect was strongest in the center. The soil had not been moved."

-- From William Corliss, <http://www.science-frontiers.com>.

Although there is certainly a close similarity between ball lightning and crop circles, I don't think crop circles are simply the result of ball lightning (farmer Fuehrer notwithstanding). In glow mode or arc mode, these forms (the ball lightning) are tremendously variable in their amazing displays and lifetimes, but the power level is simply too low to account for the large-scale effects produced at crop circles, like leveling a 30-foot diameter circle of full grown wheat crop in under a minute. Ball lightning is estimated to require only 25 watts of power to sustain a 10-inch diameter ball in glow mode for periods of 2 to 10 seconds. That is almost nothing. Even a ball which shines at a brilliant 5000 Kelvin (which has been observed) and melts a circular hole through a window, is not exhibiting much beyond what a quartz utility-light produces -- perhaps 500 watts.

There are simply no available data on the energy requirements of a grain crop circle. It would at any rate be difficult to evaluate the forces required to heat and bend the grain in a 30 feet (10 meter) diameter circle. There is, however, one report on a temporary crop circle formation on water, at the Loosdrechtse Plassen, a series of lakes in the province of Utrecht, in Holland, in June of 2002, by Martin van Wieringen, a Ptah Foundation (World Mystery Research Center) observer:

"After a short trip with my boat on the Loosdrechtse Plassen at 01-06-2002 around 3:30 pm, I saw a sort of a mist on the water surface which appeared suddenly. The result was a fast rotating cylinder of water with a diameter of approximately 20 meters on the water surface. This cylinder of water was "sucked up" from the surface with a height of approximately 2 or 3 meters. The pattern of the cylinder looks similar as a vortex pattern."

"First I thought it was a tornado, but that wasn't what causes this cylinder of water. This because the cylinder was flat at the top. The cause of this cylinder of water sprayed the water on top of the cylinder. The result looks the same as a combination of a tornado and the properties which are characterized of how crop circles are formed. After approximately 15 seconds the cylinder collapsed, but after a short break another rotating force was following a long "path" of approximately 50 meters. After this path disappeared, a new cylinder of water rises from the surface. This cylinder had a diameter of approximately 8 meters."

-- Dutch Crop Circle Archive, <http://www.dcca.nl>

At 1000 kg per cubic meter, 630,000 to 940,000 kg of water were raised two to three meters above the water level, and forced to travel in a circle for 15 seconds. That is certainly a lot more energy than what is associated with ball lightning.

I have experienced waterspouts on Lake Michigan (as a pair), but they rose into the sky as funnels; they were not flat topped.

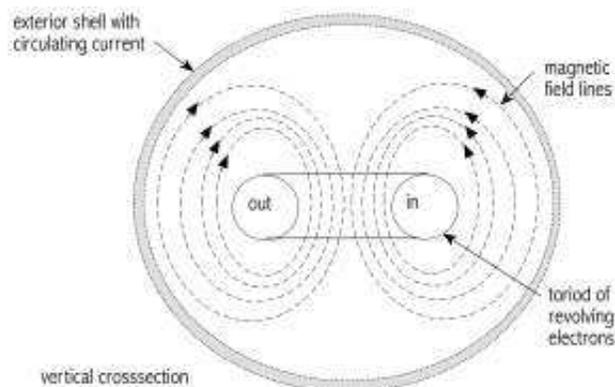
John Abrahamson, A. V. Bychkov and V. L. Bychkov have presented a collection of ball lightning encounters (still held to be "fantasies" and "delusions" by scientists), in "Recently reported sightings of ball lightning: observations collected by correspondence and Russian and Ukrainian sightings" (*Philosophical Transactions of the Royal Society*, 2002).

The contents of this paper reiterate what is already known about ball lightning, with the exception of the violently exploding dropped "ball of light" reported by farmer Fuehrer.

Abrahamson, with J. Dinniss, also constructed a model for ball lightning, detailed in "Ball lightning caused by oxidation of nanoparticle networks from normal lightning strikes on soil" (*Nature*, 2000), which suggest that ball lightning represents the slow oxidation of nanoparticles of silicon from soil vaporization due to high-temperature lightning strikes. Amazingly, almost all the properties of ball lightning can be ascribed to this chemical process.

Similarly, David Turner, in "The fragmented science of ball lightning" (*Philosophical Transactions of the Royal Society*, 2002), attributes ball lightning to a process of hydration of the outer shell of atoms or ions.

Lastly, and as yet another example, J.B.A. Mitchell, et alii, in "Evidence for Nanoparticles in Microwave-Generated Fireballs by Synchrotron X-Ray Scattering" (*International Conference on Phenomena in Ionized Gases*, 2007), passed x-rays through small ball lightning created and sustained in a microwave oven. The scattering pattern suggests very small "nanoparticles" internally, which would seem to confirm the work by Abrahamson and Dinniss, mentioned above.



[Image: Type structures for ball lightning; after Lars Wåhlin.]

There are many other research papers published. Much of it comes close to the effects experienced with ball lightning, although extensive efforts are made to explain all the aspects of ball lightning chemically. (It is additionally not at all certain if "nanoparticles" exist.) An explanation for the exterior glow is generally missing, something which electrical engineers would at once attribute to a space charge (thermonic emission), often represented as a "boiling off" of electrons. The most obvious and easily recognized space charge effect is the glow of electrons surrounding the cathode of a neon lamp.

Ball plasma is also suspected of setting up a resonant space, within which the electric and magnetic fields will assume a mosaic of patterns. Since ball plasma in arc mode is generally only 12 inches in diameter (1/3 meter), they would be operating at a frequency of around 1 gigahertz (300,000,000 / 0.3). That is what is normally considered the "shortwave" or "microwave" range.

Lars Wåhlin (Wåhlin), in *Atmospheric Electrostatics* (1989), a book which deals with the generation of terrestrial lightning, identifies two forms of a toroidal current or a toroidal magnetic field, each capable of producing an accompanying magnetic field or current flow. Wåhlin suggests that the form with the internal magnetic field as being due to the constriction of an encircling magnetic field which pinches and cuts off a flow of current in a lightning strike. This effect has actually been observed by others. A collapsing magnetic field will induce a corresponding electric field.

The point of this is not to suggest that crop circles are degenerate ball lightning forms, but to support the fact that any moving plasma stream also produces a corresponding magnetic field. The vector product of the magnetic field and the current flow will produce a force attempting to change the direction of the current carriers -- in effect at right angles to each other. This is known as the "right hand rule" of Force, Magnetic Field, and Current (where each of these is expressed as a vector) and is the basis for the design of electric motors and generators.

... fake crop circles

Most crop circles are hopeless fakes. Even the True Believers (with apologies to Eric Hoffer) say so, and I'll buy that opinion, even if their analysis is presented in a jargon of intersecting magnetic and geodetic lines, the relationship to ancient monuments, and "remnant energies" -- with much of the geometry of intersecting lines and the feelings deduced through dowsing.

I would dismiss "dowsing" as a source of information about crop circles (or anything), but it is a fact that the same investigators report detecting the feeling of dread and nausea after entering "genuine" crop circles. If this is the "remnant energy" of a crop circle event, what exactly is felt? The word "energy" in common usage represents "potential forces, inherent powers" -- things like that, but all related to human interactions. The word "energy" in physics means something entirely different, it is "work" -- in the most basic form it is a force moving a mass through some distance.

Anyone who has taken a course in physics or mechanics would be loath to give recognition to psychological or spiritual "energies." With this in mind, the question then is, What could be felt physically after a crop circle event? The feelings of energy, dread, and nausea seem to fade with time. Humans do not react to changes in the magnetic field, or to nuclear contamination (not quickly). We

do react to changes in temperature and barometric pressure, the last of which is often recognized as the dread of an impending storm. But local barometric pressure is difficult to relate to the movement of plasma, because the inflow of the surrounding air would equalize the pressure within seconds.

But what can readily be felt, almost always, is static electricity. It remains for some time and only slowly leaks away. This is most likely the "remnant energy" as well as the "dread" felt by people in recently made and genuine crop circles.

Genuine crop circles, predictably (and as readily pointed out by any number of crop circle enthusiasts), are simple designs without symbolic significance, can be placed in fields equipped with alarms, take under 2 minutes to form, mostly come into existence at the edge of night and day (this is not entirely certain), bend grain at the nodes by (apparently) softening the nodes and then bending the stalks at 90 degrees, blow holes in nodes (suspected as due to overheating of the sap with microwaves), leave scorch marks at the base of some stalks, alter the DNA of seeds and thus their genetic future, interweave grain stalks in contrary directions, pull selected exterior stalks into the circular design, deposit ferrous iron in the soil and on plants, leave behind distinct radioactive isotopes, change the local magnetic deflection by about 4 degrees (supposedly), and dry out the soil locally.

... infrequent crop circles

Real crop circles are actually very infrequent, and the number drops every year with a drop in the number of sunspots (like the auroras do also). Even the True Believers in the UK have noted that of a hundred or more crop circles appearing in a recent summer (2010), there was not likely to be more than 1 "real" one. It has also been noted that 98 percent of crop circles appear after the weekends, and after Bank Holidays. That says something!

This candid attitude of some of the UK researchers is refreshing (my source is Freddy Silva and his site <http://www.cropcirclesecrets.org>). But the problem I continue to have with the True Believers is that they are still convinced we are getting messages from aliens, and even see these as psychically induced in the fake crop circles. In other words, it is assumed that it takes an intelligence to produce the circles, although all we seem to be getting (in the fake circles) is a roundup of geometric forms from high-school geometry and physics text. It is the sort of thing any juvenile could do. Even the supposedly vastly clever binary encoded messages used the standard ASCII character set.

The whole idea of assuming an alien intelligence is another case of "intelligent design" as a solution to the inability to imagine long time-periods, minute small changes, and the possibility of intricate biological mechanisms, or, in this case, imagine what a self-sustained plasmoid could do.

The other thing I find objectionable is that the True Believers can only extend their imagination to contemporary wants and desires. A thousand years ago people would have suggested that aliens should bring us eternal life and gold. Today it is "advanced technology" and "new mathematical theories." I cannot believe this simplistic attitude. If I wanted anything from the aliens, it would be a deliverance from our ferociously murderous antipathy toward each other. Second would be deliverance from lying politicians and, third, greedy people.

... genuine crop circles

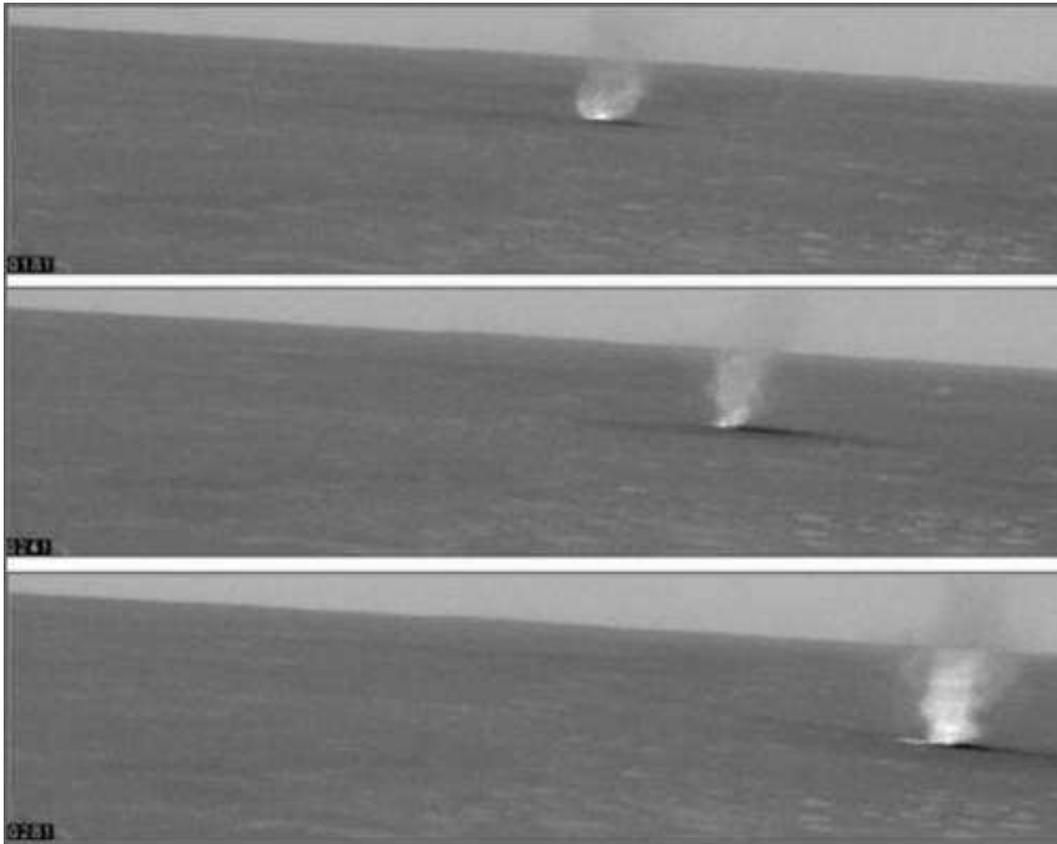
What I am suggesting here is that crop circles are real, although very rare (especially today), that these had probably been experienced much more frequently in remote antiquity, and that they are the result of a spherical geometry of dark mode plasmoids exiting the Earth's surface. This claim can be made despite the fact that there are many fake crop circles (estimates of 80 percent fakes by Colin Andrews in 2000, and estimated at 99 to 100 percent by Freddy Silvas in 2010).

In remote antiquity the experience of crop circles would have been much more frequent, and would have been convincing evidence of being in the presence of a God, localized to a sacred site. Entering the room where at night I once experienced ball lightning still sends shivers down my spine. Imagine being out in a field in Neolithic England and seeing grasses suddenly bending to lay down in a circular geometric formation, accompanied by the certainty of a "presence." The humans of the early Neolithic in England must have recognized the condition. Crop circles today appear with the greatest frequency where circular monuments were built in the Neolithic. God was visiting. [note 19]

... plasma defined

I think, then, that crop-circles are caused by rising elongated plasma streams in dark mode (imagine it to look overall like a giant rotating turnip or carrot), and thus of large sizes, 20, 30, or 40 feet (7 to 13 meters) in diameter. Other people have also reached the same or similar conclusions over the last decades, although some of it was given over to weather phenomena. But plasma streams and even ball lightning have only recently come forward for consideration. [note 20]

Plasma is a diffuse stream of electrons or ions (or both). If it travels down from the ionosphere or upper atmosphere it will tend to form into tightly compressed streams. In various quantities of plasma flow, these are dust devils, waterspouts, tornadoes, and, in much larger form these are hurricanes. Lightning is plasma in arc mode (from intermediate cloud layers). "Plasma" is thus a term loosely meaning a continuous flow of electricity.



[Image: Dust devils on Mars; after NASA.]

For dust devils, waterspouts, and tornadoes, electrons or negative ions (O_2 and NO_2 anions) are moving to Earth; the flow of current is thus upward. This defines a counterclockwise circular magnetic field, as seen from above, surrounding the stream of electricity. Any ionized material near the base will try to follow the circular magnetic field lines and rotate around the center of the plasma stream. This would include dust and dirt from the surface which would be positively ionized by induction. Tornadoes are the most pesky manifestation.

Dust devils are seen on Mars, rising 300 hundred feet (100 meters) up from the surface, although there is almost no atmosphere on Mars. The tornado-like forms consist entirely of ionized dust. Electric arcing can be seen at the base where the devils touch the surface of Mars and where these cyclones concentrate current flow to arc mode. They leave behind blackened trails.

The base of a tornado is tubular, and rasps the Earth like a router. The magnetic field at the center is downward directed, and up directed at the outer edges. The loosened dirt, trees, cars, houses, and other debris are levitated electrically (aided by the upward directed magnetic field) at the outside of the funnel -- not in the interior.

As opposed to tornado forms, I would suggest that crop circle plasmoids rise out of the ground. If the crop circle plasmoid is of a limited size, then the flow of electric current will create a solenoidal magnetic field within the core of the plasmoid, and directed oppositely on the exterior of the more or

less tubular plasma formation.

The travel of an electric current, which will also exhibit itself in the stems of grain crops (since the stems are conductors), will produce a force at right angles to the direction of current flow and at right angles to a magnetic field, attempting to move the conducting stems into a path at right angles to the overall upward movement of the streaming plasma. The individual blades of grass would experience this force. The flow of electricity in the grass is upward at the outer circumference and otherwise inward directed. That would result in snapping the grass blades at right angles at the nodes (a weak point), and tangentially to the radius of the crop circle. And this is the effect that is seen.

Let me add perhaps another few qualifications. First, as suggested above, the plasma streams upward, based mostly on the Loosdrechtse Plassen experience. This could reasonably be expected also from the fact that the Earth maintains a charge balance, so that, for example, charge transferred to the surface via thunderstorms or tornadoes will be offset, sooner or later, by plasma streaming away from the Earth.

Second, there is no reason to suggest that the streaming plasma could not revert to glow mode or even arc mode on moving up past the surface of the Earth. This is plasma; almost any form could be taken. There are a number of instances of observers having seen brief beams of light emanating upward from attested genuine crop circles.

The crop circles are all about that, apparently, except that the True Believer observers think that something lowers to the ground from higher up -- thus you get claims of flying saucers and extraterrestrials. I think it is more likely that these phenomena move up from below ground, since they keep occurring in nearly the same locations. The direction of travel, together with occasional observations of lighted spheroid shapes (even photographed at some crop circle locations), would suddenly account for various "UFO phenomena." UFOs almost always rise up, they are not seen to lower to Earth.

[note 21]

Special thanks to R Houston for pointing out the plasma sources.

Special thanks to R Boerman for a discourse on crop circles.

Endnotes

Note 1 --

Leroy Ellenberger, "An Antidote to Velikovskian Delusions" in *Skeptic* (1995) or at <http://abob.libs.uga.edu/bobk/velstcol.html>. But the point of a valid criticism is entirely missed. All the Saturnian writers almost to a man have assumed without hesitation that the source data for the essay by Jastrow is applicable to the period before 3147 BC -- the "Era of the Gods" -- rather than entertaining the possibility of a very late period.

It is just insane to suggest that any people would keep such idiotically detailed records alive for 3000 years. As a matter of fact, almost all of the associated records which do not deal with planets are clearly contemporaneous economic records from the 8th and 7th century BC: the cloud cover in the morning, the prices of grain, dates, and lumber. And as soon as the Assyrians lose their control over the fortune-tellers and astrologers of Babylon (in 612 BC), the records cease. Almost all the

Babylonian records date to after 650 BC.
[return to text]

Note 2 --

Revelations is based entirely on contemporaneous astrological concepts of the first century AD. The letters to the seven churches, which open the text, are addressed to the seven planetary Gods. The sign of the beast, 666, represents the number of years needed for a change of the equinox of one decan -- ten degrees -- along the ecliptic. The number 666 is one of the measures for the precession of the equinox current after the second century AD (66.6 years for one degree; today this is 72 years). The "beast" refers to the bestiary of the zodiac.

[return to text]

Note 3 --

The King James Bible quotation is awkwardly worded, "I will bring again the shadow of the degrees, which is gone down in the sun-dial of Uzziah, ten degrees backward." Ronald Knox has, "see how low the shadow has fallen, with sun-down, where the dial of Achaz [Uzziah] marks the hours! I will make it go ten hours back."

We are, at any rate, talking about a shadow which was longer than expected (it was a winter-time shadow). At a latitude of 31.68 degrees north, the Sun at the equinox assumes an angle of 58.34 degrees with the horizon (58.38 before 685 BC). After 685 BC, in 684 BC, the Sun culminates at 52.34 degrees on March 6th -- on the old day of the equinox.

The reciprocal of the tangent, $\cos(\)/\sin(\)$, measures the shadow on the ground as a fraction of a gnomon of unit height. Thus the shadow on March 6 (on the equivalent day of March 21), before 685 BC, was:

$$\cos(58.38) / \sin(58.38) = 0.615.$$

On March 6, 684 BC, it was:

$$\cos(52.34) / \sin(52.34) = 0.771.$$

The fractional difference in the shadow is:

$$(0.771 - 0.615) / 0.615 = 0.25,$$

... representing a lengthening of the shadow by 1/4th of the original length.

[return to text]

Note 4 --

Charles Raspil "Planetary observations of the T'ang" (*1994 International Velikovsky Symposium*). The base information is from Edward Schafer, *Pacing the Void, T'ang Approaches to the Stars* (1977). Raspil supplements it with information from European, Byzantine, and Islamic sources. Raspil writes:

"Probably because of his shock at finding so many incredible astronomical observations (for e.g., fixed stars that blink on and off, or disappear for awhile, or appear with horns or other appendages; or planets that give off ribbon or flag-like emanations), Schafer attributes to T'ang astronomers talents that suggest that their greater competence is as whimsical poets."

Raspil could not deduce a consistent pattern, except to suggest that many anomalies happened during "conjunctions." Kepler is quoted as an example of the thinking of medieval astronomers (astrologers) on conjunctions:

"experience shows that all sorts of meteors were seen when the planets were configured in aspects, whereas the air was undisturbed otherwise."

"Aspects" are the angles made by celestial objects to each other, measured across the 360 degree circle representing the dome of the stars. On March 18, AD 904, Venus was indeed very close to the Pleiades.

[return to text]

Note 5 --

I should note that Velikovsky may have "Venus not added" wrong. In an address by Abraham Sachs at Brown University on March 15, 1965, Sachs noted:

"In 'Worlds in Collision', p. 161, Dr. Velikovsky says that Babylonian astronomy at one time had a four-planet system, with Venus missing. For this, he refers to a book written in 1915. Not being a cuneiformist, Dr. Velikovsky cannot inspect the original text referred to in his 1915 source. I have read the text and I can report that it is quite true that Venus is missing in the text-- but so are the other four planets. Dr. Velikovsky's 1915 source mistranslated the names of four fixed stars as planets."

A transcript is at <http://abob.libs.uga.edu/bobk/vsachs.html>.

Marinus van der Sluijs in "gods-and-planets.htm" at mythopedia.info [since removed] provides an extensive critique of the ready willingness with which the Saturnians (Talbot, Cardona, and Cochrane) assign the Gods of the Polar Configuration to various planets (as I have done as readily). He writes, about the Babylonian astronomy after 600 BC:

"The fact stands that the Babylonians often employed the same divine names for various planets. [And, it should be noted, also mixed them with the names of stars and constellations.] Why they did so is far from clear to us. It seems unlikely that the Babylonians of the first millennium BCE could not properly distinguish between the various planets. David Brown [see the text] argues that a name applied to more than one planet in the period he studies has nothing to do with confusion or unclarity on behalf of the Babylonians, but is indicative of a system whose rationale escapes us today."

"The 'logical problem' introduced with the realization that myth communicates with us through symbols, simply forbids us to take the mythical or folkloristic statement that the gods were planets literally. If we accept that a god was Mars or Saturn because the myth says so, we ignore the principle that myth speaks through symbols. What we ought to suggest,

acknowledging both the planetary association and the symbolical nature of myth, is that a certain visual prototype was symbolised by the myth-makers as the planet, because of certain similarities the planet had in common with the remembered prototype."

Myths are not "made." They are recollected history, and have no symbolic content, despite the three assertions by vd Sluijs in one paragraph. If Van der Sluijs conceives of myths and legends as "symbolism and displacement metaphors," I think he is making an enormous mistake for a self-proclaimed mythologist. I have been at pains to explain that the ancients were incapable of abstract metaphorical reasoning and symbolic notions in earlier times, and certainly did not "think" in the manner understood by us. Van der Sluijs's insistence on "symbol and metaphor" introduces an unwarranted and unneeded contemporary point of view when applied to concepts which have their sources in remote antiquity, although by the 8th and 7th century BC, the use of metaphors and symbolic reasoning was certainly in use.

By his own admission, van der Sluijs argues exclusively from the mythological point of view, not, as he states, from an interdisciplinary perspective (which would include the hard sciences), although he will readily admit that the legends and myths have their genesis in the visual effects of the polar display. Additionally he quotes extensively from older sources, none of which have considered earlier celestial catastrophes or the confused sky up to the seventh century BC as influencing the identification and naming of the planets.

In my point of view, the primary Gods to the ancients were real persons who could be seen in the sky -- as globes which today we call planets. Only after 1200 BC or so do they start to acquire spiritual qualities. To the Chaldean (Babylonian) prognosticators of the 7th century BC, the Gods had indeed become physical entities, which moved across the sky like so many chess pieces to determine the fate of nations and individuals, and had to be treated yet with respect, for the priests were in the employ of the pre-conscious Assyrians to whom the Gods were still very real personages. Contemporaneous with the Assyrians and Chaldeans, Homer treated the Gods in complete mockery.

Lastly, it has been noted that the names of the Egyptian Isis, Osiris, Horus, and Seth, the Greek Athena, Kronos, Aries, and Zeus, the Sumerian Inanna and An, the Canaan Ishtar, and Babylonian Marduk (and more) do rotate somewhat haphazardly among the planets Venus, Saturn, Jupiter, Mars, and Mercury. The correct identities are not always certain. The best test is to use the insight of the Greeks during classic times, that is, if two Gods have similar histories and characteristics, they *are the same* even though they might be known by different names in different lands.

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Note 6 --

Mithra is also one of the Hindu pantheon, representing the shining Sun disk of daytime, and was also known among the Hittites of Anatolia in circa 1500 BC, as well as among the Zoroastrians. His popularization is likely due to the influence of Mazdaism at the time of the Persian Empire.

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Note 7 --

See David Ulansey *The Origins of the Mithraic Mysteries* (1989). Most of what we know about Mithraism is from the writings of the Church Fathers -- Jerome, Tertulian, and others, plus a number of Greek and Roman authors. Ulansey comes to the same conclusion as I do, that is, that Mithraism is in response to a change in the equinox. Ulansey bases his theory on the suggestion that a knowledge of the precession of the equinox came to light in the third or fourth century BC, despite the fact that the iconographic references of Mithraism are to Taurus and Scorpio as the constellations of the equinoxes. Using today's estimate for the precession of the equinox, and assuming that the precession of the equinox had always been the case for Earth, this would place this configuration in about 2000 BC. This is unlikely as a remembered condition, and cannot be related to any significant event. There are just too many intervening events and religious rethinkings to make sense of this.

Ulansey equates the stance and gesture of Mithra in sculptures to the depiction of Perseus after decapitating Medusa (the Gorgon), that is, looking away. He also draws parallels between the Gorgon and the frequent depiction of a lion-headed God entwined by a snake and standing on a globe representing the Earth, or, more likely, representing the globe of the stars as seen from a remote exterior. This apparently became a standard depiction in the Middle East and Greece. Globes of the stars at this time start to show both the equatorial and the ecliptic as encircling bands.

I could add to the confusion of associated imagery by noting that the Gorgon is Venus blazing in 685 BC with plasma streamers as hair, although Perseus is nowhere nearby (Perseus is above Taurus). Additionally, the image of the Gorgon is much older than 685 BC. Medusa is one of the three sisters of the south of remote antiquity, dating to after 10,900 BC. She is the main ball plasmoid which could not be looked at -- but only because it was far too bright to endure. Peratt has suggested the brightness also, in noting that many petroglyphs were carved only where the artists would be shaded from the brightness of the ball plasmoids.

Ulansey's lion-headed God is the Sun in the constellation Leo on July 25th of 685 BC, when the plasmoid from Jupiter landed after midnight and the eastern sky blazed for nine hours. The entwining snake is (likely) the plasma plumes appearing at the north and south magnetic poles of Earth under the conditions of a radical change in the field of the Sun.

What confirmed for me the common core of this diverse and unfamiliar imagery was the depiction of the lion-headed God as item 312 in Maarten Vermaseren's *Corpus Inscriptionum et monumentorum religionis mithriacae* (1956), where the statue wears a plasmoid bolt on its chest, rather than the usual Gorgon head. This is also illustrated on page 33 of Ulansey's book.

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Note 8 --

Although I guessed at this, as I found out later, David Ulansey also agreed that the boys with the torches represent the vernal and autumnal equinox, and Ulansey also admits that the symbolism is at times reversed. I did not check to see if Ulansey considered the visual crossing of the ecliptic and the equatorial or the factual crossing.

The crossing of the equatorial and the ecliptic is also notable in Mesoamerican iconography. The same symbol is used, the Saint Andrew's cross, where one of the diagonal bars crosses the other, a different configuration for the spring and fall equinox. For the vernal equinox the bar starting at the upper left crosses in front of the other. The autumnal equinox reverses this. The visual representation

in Mesoamerica is based on the shadow of the Earth falling on the last ring of the Absu, which lasted well into the current era.

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Note 9 --

The event of 685 BC had happened 80 years before Lao-tse was born. Reading "Tao" as the road, meaning the zodiac, and "Thien" as heaven, meaning the dome of the stars, the text, although with obvious strong philosophical rather than scientific overtones, becomes immensely elucidated. See especially the introduction of James Legge in the *Sacred Books of the East, Volume 39* (1891) and the comments on translations by Kelley L. Ross at [www.friesian.com/taote.htm].

A typical interpretation of Taoism was made by Sze-mâ Khien, writing, in the first century BC, "Lâo-dze [Lao-tse] cultivated the Tao and its attributes, the chief aim of his studies being how to keep himself concealed and remain unknown" (quoted by Legge). This represents seeking a high moral order by imitation of the still-standing and unknown quantity -- eventually identified as "Heaven" even by the Confucianists -- behind the dome of the stars which had made such a sweeping change in 685 BC.

Confucius, born in 551 BC, must have been aware of the change, even though it happened 100 years before his time. However, it is not mentioned in any of his writings. To us, the most important works of Confucius were his compilation of ancient records, his preservation of a thousand years of poetry, and his annotation of the *I Ching*. But to Confucius himself, his most important work was the compilation of a year-by-year political record of his home state of Lu, the *Spring and Autumn Annals*, covering the years 722 BC to 481 BC. He specifically noted the importance of the *Spring and Autumn Annals*, working on it until shortly before his death. This period was also a time of internecine struggles among the nearly independent states, and the Confucian Annals have given their name to this period of Chinese political history -- the "Spring and Autumn" period.

His students and followers knew how Confucius felt about the *Spring and Autumn Annals* and elevated the book to the status of one of the five Confucian Classics. Yet the contents lack any philosophical observations and the entries relate activities which are all too terse and mundane to be of any interest.

If Confucius was searching among historical data for the effect of the change in the zodiac, it does not show. An inspection of the *Spring and Autumn Annals* yields nothing of note during the years spanning 685 BC. Some 37 eclipses of the Sun are listed for the complete period, of which all except two were verified in the 19th century. Five floods are listed, four earthquakes, three comets, three lightning strikes, and many rains of excessive magnitude.

The *Spring and Autumn Annals*, and the commentary by Tso Kew-ming, the *Tso Chuen*, are instead totally absorbed with the human failings of the leaders -- issues of honor, insults, and reputations.

China at that time was an inland nation, with the coastal regions held by "barbarian" tribes. Thus China did not use the stars for navigation, as the Eastern Mediterranean did. Little attention was paid to the stars or the planets, which to the Chinese did not represent earlier Gods. For example, when a large comet appeared in 524 BC the recommendation by the priests and court historians to perform extra sacrifices to avoid disaster were ignored. An earlier solar eclipse in the same year was

accompanied by similar recommendations and response (from the *Tso Chuen*).

Frances FitzGerald, in *Fire in the Lake* (1972), details the outlook of the people of Viet Nam in recent times as a conservative Confucianism with the deeply imbedded elements of the Tao. The politics and social order for the Viet Nam "way of life" -- what FitzGerald calls "state of mind" in her first chapter -- are essentially Chinese, 2000 years old, rational and pragmatic, and so astoundingly different from European and American thinking and outlook as to be virtually incomprehensible.

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Note 10 --

From the introduction to the *Zend-Avesta*, by James Darmesteter, in *Sacred Books of the East, Volume 4* (1880):

"The world, such as it is now, is twofold, being the work of two hostile beings, Ahura Mazda, the good principle, and Angra Mainyu, the evil principle; all that is good in the world comes from the former, all that is bad in it comes from the latter. The history of the world is the history of their conflict, how Angra Mainyu invaded the world of Ahura Mazda and marred it, and how he shall be expelled from it at last. Man is active in the conflict, his duty in it being laid before him in the law revealed by Ahura Mazda to Zarathustra. When the appointed time is come, a son of the lawgiver, still unborn, named Saoshyant, will appear, Angra Mainyu and hell will be destroyed, men will rise from the dead, and everlasting happiness will reign over the world."

The Persians only used open fires as altars. Fire altars were in use for sacrifices to the Gods since remote antiquity in China, Central Asia, and India. These are modeled on the "fire on a platform" seen in the sky after 4077 BC when Saturn went nova. In Western Asia, Eastern Europe, Mesopotamia, and Egypt the image of Saturn in the sky is understood as a house instead, and temples are built as houses for the Gods.

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Note 11 --

The celebration of Dionysus formed the basis of Grecian theater. As is noted by Alfred de Grazia in *The Disastrous Love Affair of Moon and Mars* (1984), it consisted of the introduction of a folk art form into an unformed society of survivors of the destructions of the 8th and 7th century BC.

"The theory of causation seeks evidence of abrupt takeover of a destroyed culture by marginal survivors who cast aside, or employ ceremonially, practices they do not or cannot use or understand. Then they proceed to draw from every source their new synthetic culture."

"... when the Greek theater appeared [writes Giovanni Patroni], we find the rustic god Dionysus, with a goat-cult of dancers cloaked in skins. The poverty of the means, the few actors, the vagabond origins of the Thespian theater, all showed still, according to Patroni, that the primitive real Greek theater was not receiving the subsidies of princes, not the interest or participation of Mycenaean high society; it was left to the rural folk. ... In the general destruction of societies, the art of the survivors made its way quickly forward. The elite and its sophisticated art forms were destroyed; folk art (not primitive art) dominated the scene."

-- Alfred de Grazia
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Note 12 --

See Kelley L. Ross at [www.friesian.com/upan.htm]. He continues with the following (describing the transfer of ideas some 700 to 900 years later):

"The undoubted transfer of ideas between Greece and India in the Hellenistic Period, and the export of Buddhism from India to China beginning in the Han Dynasty, provides us points of comparison with what, the uninfluenced traditions, came before."

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Note 13 --

For a development of Greek philosophical systems from about 500 BC to about AD 200, see the first half of Charles Freeman's book *The Closing of the Western Mind* (2005). Later chapters detail the rise of Christianity after Constantine, up through the time of Aquinas.

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Note 14 --

Livio Stecchini reports that a change to a differing dating system was initiated in Greece and Rome after 747 BC without reference to concurrent changes in Mesopotamia. See *The Velikovsky Affair* (1966).

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Note 15 --

"It [the Milesian school of philosophers] set about to explain these phenomena [lightning, earthquakes] in terms of the same elemental processes ... as it invoked to explain the orderly arrangement of the earth and the heavenly bodies. In so doing, it implied the baselessness of the traditional Olympian religion which attributed lightning and earthquakes to whims of Zeus and Poseidon and world-destructions to battles of the sky-gods."

-- William Mullen, "The Agenda of the Milesian School" *Natural Catastrophes during Bronze Age Civilisations*, SIS Conference, (1997).

Thales of Miletos (640 -- 546 BC) is traditionally held as the first Greek rationalist investigator, based on his total rejection of the role of the Gods in creation, and his conclusion that everything was made from water (attributed to Thales by Aristotle). We see this as the first primitive atomic science. But consider the fact that, with this statement, Thales is repeating the oldest creation myths, which hold that everything indeed was made from water.

The measurement of the year and the rationalization of the periods of the Moon is also attributed to Thales. Apocryphally, to Thales is attributed the advice to navigators to steer by Ursa Minor, rather than the traditional Ursa Major.

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Note 16 --

The circumference of Earth was found by Eratosthenes by measuring the length of a shadow in Alexandria at noon on the solstice, when it was known that, at the same date, the Sun was directly above Syene (Aswan). The distance between the two locations, at almost the same meridian, was known from Egyptian surveying records and probably accurate to within a few hundred feet. The most generous measure of his estimate for the circumference, 252,000 "stadia," based on an appropriate selection of a "stadia" (there are three differing measures for "stadia"), is 24,662 miles, which is within 198 miles of being correct -- and despite the fact that Syene and Alexandria are not at the same meridian, and that Syene is not located exactly at 23.5 degrees north. See Justin Pollard and Howard Reid, *The Rise and Fall of Alexandria* (2006). This book is a wonderful compendium of ancient science and philosophy, covering 330 BC to AD 650.

Robert Crease, a historian of science, writes in *The Prism and the Pendulum* (2003) about Eratosthenes,

"Eratosthenes's picture of the cosmos [a model] was critical to the success of the experiment. Without this particular picture, measuring the shadow would not yield the earth's circumference. For example, an ancient Chinese cartographic text, the 'Book of the Masters of Huainan' [139 BC], notes that gnomons of the same height but at different (north-south) distances from one another cast shadows of different lengths at the same time. On the assumption that the earth is essentially flat, the author attributed this difference to the fact that the gnomon casting the narrower shadow is more directly under the sun, and argues that the difference in shadow length can be used to calculate the height of the sky."

This would have worked, but would not have resulted in a useful model, for the statements above are based on the concept of Earth as a flat plane.

The "picture of the cosmos" in Eratosthenes's time was derived from Aristotle: the Earth as a globe. It is one of the "narratized mental spaces" mentioned in the text, and it need not be a valid point-for-point representation of reality, as many models of physics will testify. Appropriate results from the exploration of this mental space are the only criterion for usefulness.

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Note 17 --

For elements of statistics and probability theory in the context of their historical development which parallels common attitudes toward chance, see Michael Kaplan and Ellen Kaplan, *Chances Are* (2006).

The Greeks also developed the concept of the soul as a separate entity, which leaves the body on death and continues a life of its own. The concept was taken up by a number of writers and philosophers in Greece, first used in the sense of a transmigration of the soul. The idea of the existence of the "soul," unlike the idea of "free will," quickly spread to other cultures, introducing itself into the thinking of the Middle East and Alexandria, and was readily adopted by Christianity.

"Life after death" was not a common Greek concept in the period before the current era. A "land of the dead" was, however, interpolated into both the *Iliad* and the *Odyssey* after 500 BC, and achieved its modern definition with Plato after 400 BC.

The Romans did believe in the concept, and as a result developed a much higher social morality. But it was apparently already an accepted concept among the tribes north of the Alps (if we go by the medieval legends of the Celts).

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Note 18 --

Not that there are not some very strange things reported by BLT Research, especially with Robbert van den Broeke.

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Note 19 --

It could be suggested that adding a series of posts or megalithic stones would help in concentrating the incoming (or "outgoing") plasma to the same location, and hence the building of henges. But this contradicts my earlier supposition that the number and location of the posts or stones replicated the look of the plasma stream seen incoming from the sky overhead. Henges were mostly abandoned after 3000 BC.

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Note 20 --

I have seen suggestions of "plasma" on crop circle web pages, but they are often presented as some form of air disturbance and in terms of magneto-hydrodynamic fluid flows. See an article "The Physics of Crop Formations" (1998), by John Burke, at [BLT], which suggests plasma discharges as the cause (although Burke has not much of a handle on the mechanics of either plasma or electricity) and traces the original suggestion to George Meaden's book *Circles from the Sky* (1991). Meaden is a meteorologist and physicist.

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Note 21 --

Robert Boerman, a Dutch author, wrote to me in an email in 2008:

"I have studied the crop circle phenomenon for 11 years from 1997. I visited, researched, photographed, measured and studied almost every single Dutch crop circle from 2000 to 2006, wrote two books about it, and now, after all those years of research, I don't know it anymore. The phenomenon is too complicated. What I found out is that there is a link between plasma (balls of light?) and crop circles. And I think that some of the crop circles are formed by nature itself, some by human mind, some definitely by hoaxers."

Boerman was the first to make me aware that he and other people were considering crop circles as a plasma phenomenon. See his website at <http://www.dcca.nl/index.html>.

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*Calculations are in Unix bc notation, where ^ denotes exponentiation; the functions a(rctangent), s(ine), and c(osine) use radians; angle conversions to radians or degrees by the divisors rad=.0174 and deg=57.2958; other functions are shown as f(); tan()=s()/c()
units: million == 1,000,000; billion == 1,000,000,000;
AU == 93,000,000 miles.*



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