INTERNATIONAL JOURNAL OF HISTORY

E-ISSN: 2706-9117
P-ISSN: 2706-9109
Impact Factor (RJIF): 5.63
www.historyjournal.net
IJH 2025; 7(10): 22-38
Received: 23-08-2025
Accepted: 26-09-2025

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Ancient time-& space; periodisation; *Sanatan vigyan* via indo archaeology

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DOI: https://www.doi.org/10.22271/27069109.2025.v7.i10a.532

Abstract

Background: सनातन विज्ञान \ *Sanatan vigyaan* (perennial sciences) alias वेदिक विज्ञान *vedic vigyan* (Indian plural sciences) has an enviable tome of tradition & literature about ब्रह्माण्ड (Brahmanda cosmos); space-&-time.

Problem\Objective: However, no archeological member nor any workable device has thus far been reported; scientific validation included.

Result: We herein report one such item known as the षहस्रलिङ्गम् *Sahasralingam* (millennia indicator) and also describe and discuss 'how to use' and 'how to infer' ~ hand-on.

Main Points: Time being the enquiry sun's light-shade is used as reference. The Sahasralingam monolithic devices is wrapped with an etched abacuses. We use it for study. Posits as versatile to ascertain earth-sun space architecture; evidenced earth orbit's sun in खगोल *khagola* (infracted circle) at a curvature of 7^0 (degrees). Light in space is in relation to shadow on earth; shadow shifts as motion in space; it's angle as motion's plain; it speaks the time in space. Such end products computed and hypothesis is formulated as सिद्धान्त युगाब्द \ *siddhanta yugabda* (optimized space-time period theories). Such periodisation not provable beyond bronze age\ कलि युग \ *kali yuga* (quarrelsome period). Such periodisation, optimisation, numerical & geometrical methods, etc., was unlimited brain storming game using mathematics to compass space and calculate {inter space} time related academic gymnastics. History of Science. Applications are pure mathematics (no religion, no state\politics only dispassionate, brilliant computational academics). 1st time, ground breaking on pan global basis.

Keywords: Sahasralingam, vedic-geocentricity, sanatan vigyan, yugabda\optimized periods, hindu astronomical periodization, history of science

Introduction

Astronomical periodisation is conspicuous by absence in Occidental philosophies, culture & traditions. It is a high water mark in Hindu\Buddhist philosophies with alpha numerics, geometry being used in abundance as compared to alphabets and as such is a robust, independent stream. We examine only the Hindu i.e., सनातन सिद्धान्त विज्ञान *Sanatan siddhanta vigyan* (perennial established sciences). It pre dates Arya Bhatta (c.476 A.D.) by a wide margin. सूर्य सिद्धान्त *Surya Siddhanta* (Helio's principles) provides Helio centric concept (Earth goes round the Sun) details about solar system, the Cosmos; planetary aspects including the number of days the Sun takes to go around its own orbit Fig-1, [1-3]. This projects the scope of *सनातन विज्ञान \sanatan vigyan* beyond planetary system connotations. It is an ancient school of naked eye positional astronomy based periodisation of space-&-time, wherein are (i) terrestrial day and year being in relation to उदय *udaya* (sun rise on earth); (ii) solar day & year in relation to annual alignment of the sun-&-earth i.e., 'time-in-space'. Sun is in the outer space. It is a star. Earth is a planet. Thus, time on earth is in relation to star light in space befalling on planet earth (sun-earth alignment axis) and (iii) quite mathematical.

Fig 1a: Harihara Acarya, *Surya Siddhanta*, OSM-PLM, No. Jy.391. Author's ancestar.

Objective

Apart being quite complicated, numerically such (ii) time-& space (ii) periodisation calculations takes the beginning of the present *कल्प* \kalpa ~ eon to well beyond the time whence homosapiens evolved on earth. And, the *मत्स्य पुरान* *Matsya Purana* (Aquatic lore) at canto number 290.3-12 lists 30 *kalpas* with respective names. (each kalpa comprising of numerous *Maha-yugas* & intermissions. The present *maha-yuga* being comprised of 4,32,000 years). All this resoundingly fails the validation test based on current knowledge as have we acquired via Occidental methods of enquiry. Matters least, for we have gone back by more than 1500-2000yrs before present (which is large vis-à-vis historical scale). Yet, such historical time scale is miniature compared to the *सिद्धान्त* \siddhanta's. Our interest also intensifies when we note that almost all *सनातन* \ *सिद्धान्त* (*sanatan siddhanta*) astronomy treatise indicate that such observation and recording are in relation to *लङ्का* *Lanka'* which the ancient erudite minds meant as 'hemisphere observation locus' [4]. And, may have some tele-connection with Sri Lanka the Island nation (*note-i*); a Prakrit-Sanskrit geo-astro acronym *alias* 'apex observation locus'). Historically, Buddha's way of life germinated in India and Sri Lanka has been uninterruptedly Buddhist since 2nd B.C. More about this in Section 'Buddhist Cosmology' & (*note-Xx*).

Furthermore, in numerous sites we find firm indications of co-habitation of the 'Jaina' (model), the *द्विगम्बर्**Digamabara* (bare cosmos) and or the *स्वेतम्बर्**Swetambara'* (bright cosmos) collegiums of saints & ascetics. Confluence, convergence, competition, etc., also become eminent. The associated & co-laterals are many which needs some discussions. All this makes the scope too wide & deep. Hence, the admixed objectives are of various orders & levels. Our core objective is a search (caption) for an authentic & secular archaeological member (*षहस्रलिङ्गम्**Sahasralingam*) that at present can be an applied tool to make naked eye positional astronomy (as by the past minds) yet on the basis of the known & the proven from the realm of the modern sciences for in-situ inter-face & validations alpha numerically; compass space and calculate time via sun-shade on Earth. Examine-validate the ascertain the *yugabda* concept (period theory) as in *siddhanta* literature\tradition. Hence, our target group be the young & enterprising scholars of history, archaeology, archaeoastronomy, tangible\intangible heritage etc. We shall be limited (by caption) to an introductory, multi-disciplinary, ground breaking, heuristic, pedagogic, liberal, seminal discussions. We do not propose any revisionist theory.

Materials & Methods

(A) We present a hoary palm leaf manuscript (Fig-1 & 2) by title "Surya Siddhanta" authored by Sri Harihara Bhattacharya alias 'Acharya' (a metaphor for a collegium personage ~ Professor) translated in *Odia* script - scribe's name-&-date folio damaged **(*note-ii*)** (B) a hoary monolithic gnomon called '*Sahasralingam'* i.e., million indicator (Fig-3). This is for sun-shade observation and calculations using the geometric matrix that is etched on its body. The term '*linga'* implies 'sign\indicator' [5] and the polysyllabic phone *'sahasralingam'* connotes 100,000 indications. It is a special purpose engineered, free standing, in plum, pillar devise (gnomon), that enables in space reading of sunlight & shade at an elevation on an evenly graduated circular plane table (CPT), throughout the diurnal hours, year through. The enrolled versatile abacus permits digital conversion of the geometric forms as readings in *सुन्य* *sunya* (space).

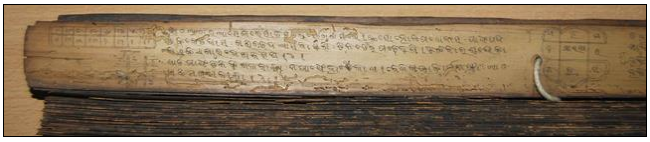


Fig 1b: Close up of a folio (Jy-391) shows tabales and graphs. Author's encestar.

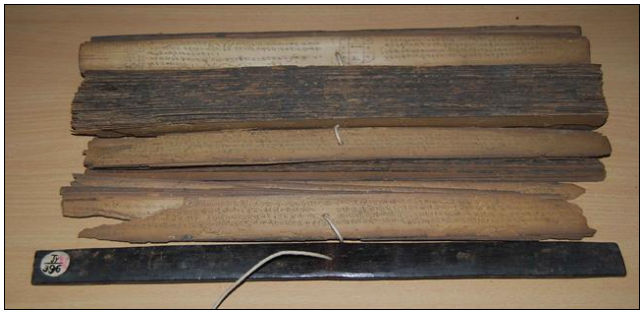


Fig 2a: Harihara Bhattacharya, *Surya Siddhanta*, OSM-PLM, No. Jy.396.

Fig 2b: Close up of a folio No.109 (Jy-396) shows drawings - astral positions. Extensive damage due to britleness and also the damage done by the borrers. Author's donation.

Surya Siddhanta is also noted in the name of Bipra, Nimba Dasa however it is only a recession [6] and hence is not considered. The contents (F-1&2) shall be presented in a separate communication.

The *Matsya Purana*\ मत्स्य पुरान (aquatic lore) [7] sweepingly states the age of the Cosmos as of 30 कल्प i.e., eons (*note-iii*).

Period is alluded to. Until Arya Bhatta (mathematical cosmologist, c.550 A.D.) the constituent periods and sub-periods had asymmetric numbers. Thus there were man an past-master astronomers. Standing on the broad shoulders of the past masters & deep pillars of related heritage in this part of the world Arya Bhatta (mathematical cosmologist) numericalised the Eon symmetrically as follows [8, 9]: 1 कल्प (eons) = 14 मनुस् \ *manus* (intermission) and 1 *manu* has 71 महा युग \ *maha yugas* (period majoris) wherein each *yuga* has 4,32,000 years on earth namely क्रता\ *krata*, त्रेतेया *treteya*, द्वापर *dwapara* & कलि युग *kali* of equal periods, respectively. And, the *kali yuga* having commenced on 18-02-3102 BC. Sree Satananda (Odisa - c. 11th A.D.) and Samanta Chandrasekhara (c.20th) have concurred with a 24hr difference (locational issue involved) [9, 10]. The moot points are त्रयम्बकम् *trayambakam* alias 3 tiered (i) Indian sciences have a rich heritage in periodisation and not merely a sense of it (ii) astronomical periodisation depended on अकास चयन *akaas chayan* (sky gazing) i.e., head & gaze turned upward; included positional mathematical astronomy (iii) passed the test of time & minds in context to time in space, wherein time transpired off light (vector). Space being encompassed on the basis of such established periods *alias* युगाब्द*yugabda* a *siddhanta* acronym (iv) being numericalised using geometric indications (*lingams*) which transcended language barrier. In archaeology or geology periodisation requires the head & gaze to be turned downwards (terrestrial oriented); small in scale; very little mathematics; entirely an Occidental science. Carbon dating being the scientific basis (neutron bombardment on noble metals/coins being another). Such civil-nuclear science application arose well post world war-II.

From heritage, nativity, versatility and multi-disciplinary aspect the *siddhanta* periodisation out smarts all. A proposition pair peeks in the mind (i) is the archaeological time line of India in synergy with her astronomical periodisation? (ii) can we locate any device in the extant (in-field or off field) archaeological remains in Indian sub-continent that can be used to locate and or fix time in space? And or architecture of the space? The answer seems to gel in the affirmative. And, that device is the *sahasralingam*. Let us visit one such and conduct in situ experiments.

On Heliocentricity

Susree, Belabasini Guha & Ahana Guha [11] had published an authoritative book in Bangla *lingua* indicating as to how the Rik Veda delved only with astrals. Inspired, we said, that, the term Rik Veda denotes “elemental plurals” and is an ode to the Cosmos. Regarding Sun-Earth nexus, the Rik at R V, 2.2 7.4 says ‘Earth goes around Sun’ albeit interpolative-&-anecdotally [12]. Indo positional astronomy based periodisation precludes heliocentricity and a solar calendar of 6 ऋतु*ritus* (seasons); the Sun having its own orbit. Else, infracts. Repeatable, deep shadow had to be the reference. Sun the planet cum fixed star was the sole best generator. No alternatives. Thus, time & space could be debated. Indian naked eye positional astronomers of yore [13, 14] had held a helio-centric format of the cosmos. Since (possibly) Varahamihira’s times (*c*.6th A.D.) [15] the geo-centric concept has ruled the roost even whilst the occidental astronomers had established the helio-centric concept. Thus in Siddhanta, complexity, asymmetry & incoherence became loud. It has always agitated the modern Indian as to how the minds pre to Varahamihira could conceptualize the helio-centric plan? This author has reported one artifact that depicts a helio-centric concept **[16]** and the same locale being conceived as having reflection of the Cosmos **[17]**, preceded by mathematical modeling **[18]**. He has also since 22yrs before present been studying the possible applied meaning of the Sanskrit (self-gelling) technical term *sahasralingam*. India abounds in variants. And, each variant is a वेदिच् विज्ञान संहिता *vedic vigyan samhita*’ i.e., compendium of extraordinary plural sciences **[19]**. The *sahasralingam* has been discussed as a secular device; π (Pi); computation; magic numbers [20]; etched & embedded astronomical maxims; pan India archaeological similar and its possible date as pre-dating Bhatta (b.476 A.D.) by a wide margin, etc., [21]**.** In this communication, the said device is used to evidence that the sun is stationary and the earth goes around it. Space, time and period could be calculated on the versatile abacus that is wrapped around it having a numerical range of 1-to-1020 (with sun as the regulator). 1020 is also a magic number.

Fig 3a: The Sahasralingam at Sri Parasurameswar Temple, Kedar Gouri, Bhubaneswar - India.

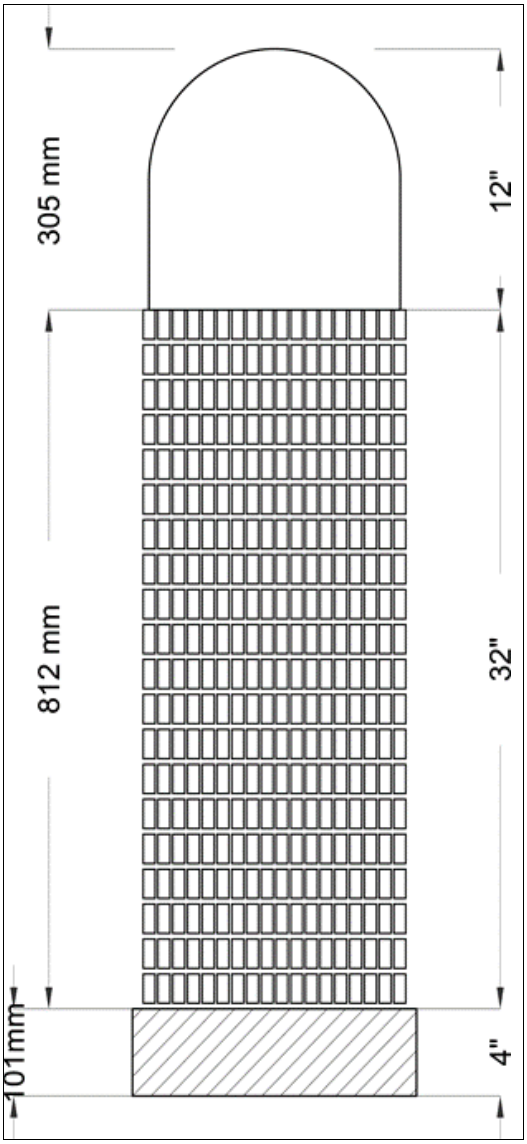


Fig 3b: Gives the details in inches. Engineering drawing. See Ref. No 20, 21 & 31 for associated aspects.

Fig-3 is a monolith & geometrically is a cylinder. It is photographically recorded at about 14-30 IST (Indian standard time) on datum Dec., solstice. The upper portion is known as रुद्र भाग*rudra bhag* (solar segment). It shows the *Brahmasutra* (cosmic maxim). The device is 48inches in height & also in circumference. It has 20 rows, each having 51 *lingas* i.e., 51 x 20 = 1020 *lingas* (magic number\magical indications). This is ancient example of repetitive cyclic arcs and कुटक*kutaka* (fractal) of an arc @ 7^0 ($360^0 \div 51$). Study ranged around two decades. A heuristic cum pedagogic method is adopted to levitate the embedded कथा*katha*. Readings are numerical via *chitra katha* (hieroglyphics) in the beholder's *lingua*. Thus, language barriers stand transcended. The Indo master archaeologists have not considered this or any such artifact from caption context [22-28]. Hence, this communication is an original & first time study.

Observing & Corelationing (at site)

The *Sahasralingam* is a cylinder. The 20 equispaced geometric circles (rings) may be visualized as 20 parallels (latitudes). Each parallel has 51 graduations (known as *lingas*) which technically form repetitive cyclic arcs on a dome & lines on flat surface and may be visualized as meridians. Hence, the *sahasralingam* can also be interpreted as a geographic grid cum abacus wrapped around a cylinder, the edge lines of which visually makes a parallelogram for subjective use. The genius of the architecture & engineering of our candidate is most-best brought out at the 'shoulder level' Fig-4 i.e., where the top ring meets the domed '*rudra bhag'* (an human head & shoulder type offset is created. Apsidal!). Being a right-angled offset it forms the top rim and also acts as a circular plain table (CPT), being *kutaka* (fractaled) into 51 equispaced graduations. The *rudra bhag* points to the local zenith thus also is a level indicator. The CPT describes the local azimuth @7^0. Such atypicality arrests the critical eye. Sun light forms a pair of umbra & a pair of penumbras. One pair being on the CPT and the other on the rings that are beset below. 2 umbras & 2 penumbras are present as co-members on either side at any given sunlit moment (a pair of couples). Light & shadow of either couple play out differently. Apsidal architecture is in consonance with the natural.

Fig 4: Possible natural inspiration. Shoulder type offset. Note the apsidal 'rudra bhag' but for which light-shadow scheme fails on the top ring.

One pair plays on the CPT. It oscillates around the *rudra bhag*. It is a horizontal phenomena (*note*: shadow lines on circular opaque bodies are vertical; butterfly type shadow is also not formed). The other (pair) plays on the cylinder. It is a vertical phenomena. The circumference of the CPT is 48" and that of the *rudra bhag* is 42" i.e., $^1/_7{}^{th}$ less at a ratio of 48": 42". Due such measure, the *rudra bhag* acts as the central staff that inflicts its umbra on the CPT (which acts as a dial). Such engineered umbra has an arc length of 19 *lingas* on the CPT. The arc length of the penumbra is 32 *lingas* (on CPT). The ½: ½ hemisphere concept of light & shade is conspicuous by absence in this pair, year through.

The umbra-penumbra pair on the cylinder plays out along the vertical plain (Fig-3). It registers the ½: ½ hemisphere phenomena. The region between the CPT and the 3rd ring is the juncture of the 2 sets (Fig-5 & 6) for change over from the horizontal to the vertical form. That happens ranging 3 rings (CPT inclusive). Such contrasting pairs are a constant feature at any referral time registering prominently in relation to the local zenith & the horizon. In other words, the recordings are done in *sunya* alias space (i) on a horizontal CPT (ii) that is consonant with the plain of the local horizon (iii) and has 51 indentured *lingas* thereon to compass the azimuth with as many (imaginary radians) at 7^0 separation. The *sahasralingam* converts the fathomless, all pervading flat light into horizontal and vertical geometric patterns with crisp boundary phenomena. The pairs are natural roulettes, readable @7^0 (tangential to each other). This is the genius. It embeds natural mathematics as alike steganography. Got possible due to ingenious engineering.

The 2 - in - 1 Events

Annually twice, a rare 2-in-1 event occurs whence shadow length (45^0 angle of the sun) is equal to the gnomon's height with collinear alignment along the E-W axis (local latitude). It is a weeklong phenomenon. It is momentous. It is the key.

Table - 1 gives the 2-in-1 event best day series at ground zero/local latitude as recorded on 02/05/2004 and re-observed subsequently every year, thereafter. Decadal study of such 2-in-1 phenomena has helped to break the jinx, which is elaborated in Table-2.

Table 1: All in IST

Date	Sun rise	2-in-1 Pre Noon*	Noon	2-in-1 Post noon	Sun set	Special Remarks
2-5-2004	5-20 AM & ½: ½Hemisphere on rudra bhag & on cylinder	8-20 AM.	11-20 AM Only Alignment.	2-20 PM	5-20 PM Sans Fibonacci. Only ½: ½ phenomena	No Butterfly type shadow (more like wide winged Bird \ aircraft)

2-in-1 is a near whole day phenomenon on such series week

Earth Goes Around the Sun

Table 2a: Shadow measurement, time, observation, remarks, notes

Sl. No	Datum	1: 1 (I S T)	Umbra	Observations	Remarks	Note
1	Mar. Equinox 3 days	9-00AM	11-1-7	Only 1:1. No alignment	Platform has moved by 3 lingas = 21^0; Away from Dec Solstice. is identical as in Sl No. 5.	A
2	4th week April	8-25AM	9-1-9	2-in-1 event	Elevation cum Alignment of Sun is identical as in Sl No. 4	B
3	June Solstice week	8-20AM	8-1-10	Only 1:1. No alignment	Platform has moved by 1 linga arc 7^0 to & fro from April position	C
4	2nd week Aug.	8-40AM	9-1-9	2-in-1 event	Elevation cum Alignment of Sun is identical as in Sl No.2	D
5	Sep. Equinox 3 days	9-00AM	11-1-7	Only 1:1. No alignment	Platform has further moved by 3 lingas; one way, away from June Solstice = 21^0.	E
6	Dec. Solstice 3 days	13-30PM	14-1-4	Only 1:1. No alignment	Platform has moved by 6 lingas; One way, away from June sol. = 42^0	F
CPT records seasonal migration of sun				Between the 2 solstices (3&6) shadow oscillates by 6-lings = 42^0		

Note

The construction of the umbra is repeated every year on such datums. On the *rudra bhag* is etched a circular line the *Brahmasutra*. It has a vertices that marks the local latitude (see Ref.5).

On date 2-in-1 the umbra of the anno-meridian event forms having a construction of 9-1-9 across such vertices. 1 is then co-incident with the local latitude. It heralds perfect alignment. Ground shadow reading not required.

Location: Bhubaneswar, 20.27^0N 85.84^0E. ** 1 linga = 7^0 (degrees).

Note: The columns as in T2a have been expanded in Table 2b

Table 2b: Meteorological data, spatial observation, ground shadow architecture

Note	Meteorological	Sunya & Bhumi (In space & on ground observation)	Ground Shadow architecture
A	xx	Sun rises & sets to the south of the LL and remains so at noon pass	Best Butterfly type
B	Strong sea breeze, clear sky (chaiti pavan)	Sun rises due E & sets due W of the LL and remains aligned day long, including at noon pass. Dawn to dusk identical as in D.	No Butterfly Shadow
Night sky is not as alike in D. Therefore, the in-space location is different. Sun has not moved.			
C	xx	Sun rises & sets to the north of the LL and remains so at noon pass	Butterfly type
D	Hot, moist, rains, torrid	Sun rises due E & sets due W of the LL and remains aligned day long, including at noon pass (monsoon clouds obstinate obstacle). Dawn to dusk identical as in B.	No Butterfly Shadow
Night sky is not as alike in B. Therefore, the in-space location is different. Sun has not moved.			
E	xx	Sun rises & sets to the south of the LL and remains so at noon pass	Butterfly type
F	xx	Sun rises & sets to the south of the LL and remains so at noon pass	-Do -
C-to-F	1 year period	The platform moves perpetually towards TN	Suggests Orbit

Location: Bhubaneswar, 20.27°N 85.84°E. **NOTE:** In Siddhanta 'aakas chayan' (night sky gazing) is a vital component.

Discussion [Table 1; 2a & 2b]

All experimentation, in-situ validation and averments are in relation to Bhubaneswar (20.27°N 85. 84°E). In Table-2a & 2b (observations column) the 2-in-1 phenomena essentially means that the sun is at a fixed position, as because the angle of the shadow is 45^0, and also aligned. However, the night sky differs {A} Earth & Sun, the 2 members of the system cannot assume the same places so as to enable (i) identical diurnal phenomena with different nightscapes during the two 2-in-1 events (ii) repeat within a span of 3½ and again after 8½ months respectively, (the full scope be of the orbit is of 12 months of time & 360^0 of space, the 2-in-1

events should have been 6 months apart). This means, there are 2 different locations in space for the 2 events {B} The platform visits these two 2-in-1 event locuses. Hence, background skyscape keeps altering. A path around the sun is the logic. Sun appears every day. Stars do not. Yet there is annual astral repetition, additionally with a time lag in star rise & set. Now, {C} simultaneous day - night phenomena with changing night sky and a near fixed sun phenomena cannot happen in a geo-centric scheme. This means, sun is stationary. The platform is shifting and also spinning {D} the 8½ - 3½ time separation of the 2-in-1 events also allude to an infracted orbit alias *खगोल\khagola* which is traversed in 51 weeks, completing a year (read with *note - iii & iv*). {E} again, post the April 2-in-1 event, the umbra oscillates along the southern side of the CPT. This means, that (in space) in relation to the sun, the local latitude / platform is to the south (sun is in *उत्तरयन्\uttarayan*). And, post the Aug 2-in-1 event the umbra oscillate along the northern side i.e., the platform is to the north (*दक्सिनयन\daksinayan*) {F} on the CPT between *uttarayan* and *daksinayan* the to-&-fro swing is along a N-S line (meridonial). The gross arc shift is of the order 6-*lingas* @ 1-linga/month. Since, 1 *linga* arc = 7^0 it works to 6 x 7^0 = 42^0 (between the 2 solstices) {G} during the 2-in-1 events umbra-penumbra's (couple) arc cover & location on the CPT are constant - which registers as a phenomena along E-W line (latitudinal) {H} all these be only in relation to the sole light source (sun). In a geo-centric scheme such tangential phenomenon(s) are not possible {I} finally, during the 2-in-1 event weeks, standing behind the device and using it as a staff, an experimenter enabled with modern time and visual recording instruments can comfortably on a day-to-day basis witnesses that the days during the 2-in-1 event period occurs with a inter-day difference of 3 minutes. It (also) means, that the platform moves. Not the sun.

Fig 5 & 6: Exposed *in-situ*. Shows sun side and the lee at 2=30IST on datum Dec. solstice. Proves the anomaly as the natural law of light play out on any indentured cylinder with a central staff. Correlate with geometric sketch Fig.7a & 7b

Meaning & Scope of 7^0 Anomaly

Fig-5 & 6 shows the juncture of the umbra-penumbra couples as are on the CPT and on the cylinder (3rd ring). The difference is of the order 3-lingas (21^0) on the sun's side (Fig.-5) and 2-lingas (14^0) only on the lee (Fig-6) indicating a contrast/anomaly of 1-linga (7^0) between either sides. This is a year round phenomena, being best viewed daily at moment 1:1. What do the two readings and/or the anomaly may mean? How are they relevant for our caption?

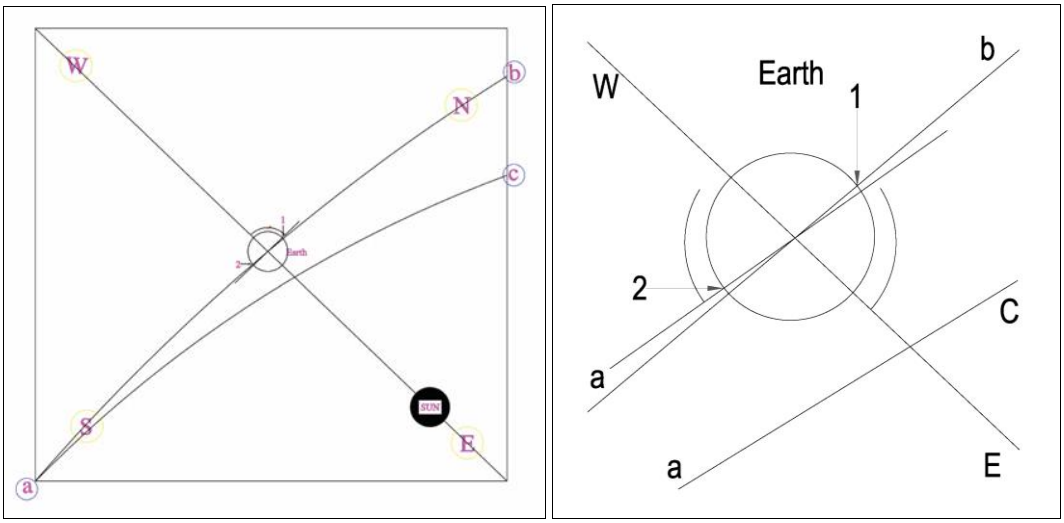


Fig 7a & 7b: Intersection of the solar plane and that of Earth's should have created 4 quadrants of 90^0 each. The reality is that each quadrant show an anomaly of 7^0. In Fig-7b position 1 & 2 show such 7^0 component in enlarged form.

Fig-7a presents graphically the geography of the earth-sun as in space as during 2-in-1 event. Line E-W represents the direction of the earth's diurnal spin and also the celestial E and the W. The opaque body is the sun on such line. N & S are the celestial north & south, respectively (are on the orbit arch). Arc a-c is a part of a 10^0 curvature. It describes a perfect circle (360^0 radians at an arc separation of 1^0 i.e., symmetry). Arc a - b is part of another circle having an curvature of 7^0. It being an odd number (7^0) describes an imperfect circle (asymmetric i.e., *khagola*). Either arcs pass through the earth's centre. Either arcs are bisected by the common true E-W sunlight line. When the angular values are compared, a difference of 7^0 is noted between the SW & NW quadrants (Fig-5,6). On the *sahasralingam* Fig -5 represents the SW and the Fig -6 represents the NE quadrant, respectively. Fig-7b graphically presents the close up of the in the space phenomenon as a-real time visual. *Inter-alia* it also means that the 7^0 is a natural product due

such natural bisection. It represents the angle of the curvature of the earth's orbital arc; also comes out as an N-S line identical as the local meridian (axis corrected earth). The *sahasralingam* captures this on the CPT as a 1 *linga* difference (7^0). In a geocentric scheme such 1 *linga* difference does not arise. This is counter validating cum internal evidence. Moreover, the informed beholder gets to see that during the equinoxes the Earth is lighted equally in its both hemisphere while it keeps altering in a measurable manner as period on earth oscillates towards Equinoxes. All such observations and readings transpire on the CPT and on the cylinder, in *sunya* (space), at eye level. By reducing the circumference of the *rudra bhag* by an order of $^1/_7$ th and coupling it with a CPT having graduations at 7^0 interval the natural phenomena are succinctly trapped. This is engineering heritage (technology).

Thus, the triplet 7-14-&-21 as natural numbers are derived. These be arithmetic\mathematic progression. Geometric patterns with such umbers offer homology. Numer 14 when divided by 3,4,5 & 6 leaves a reminder of 6,5,8 & 3, respectively. 3+4+5+6=18 is 4 more than 14, while 6+5+8+3=22 is 4 more than 18. Now 7 minus 51 = 44; the π (Pi) of 44 is 14 and √14 = 3.741 which is the smallest π value. Symmetry is noted in 'progression series' (*गणित*\mathematics) and asymmetry in π (*जामिति*\geometry). The *sahasralingam* enables the scholar to evidence such contrast (as in the Solar system); calculate it & draw it. Arya Bhatta [29] opines that π is "*asanna*" (asymmetric) which is write large in the geoms drawn with 7, 14, 21 & 51 and or their factors/exponents as the radii. And π denotes and connotes geometrical asymmetry. The phone *khagola**cosmos* is synonymous with geometric π ! *Interalia* this suggests that the past master\s have (alphabetically & alphanumerically) alluded to asymmetric relativity in space and between time-&-space. Thus relativity, algebra & trigonometry stands evidenced (*note-iv*). The moot point is that *siddhanta* literature speaks about all these numbers and methods. The same are also evidence via the *sahasralingam* [30-34]. Save & expect pure science religion is conspicuous by absence.

Summation for Fig 6-to-7

The *Sahasralingam* can be used to establish that (i) sun is fixed (ii) earth goes round the sun (iii) along a fixed orbital arc of 7^0 curvature (iv) the orbit describes an infracted circle *khagola* (v) generates an anomaly in time-&-space within the solar system (vi) solar day & earth day have been explained (vii) the angle described by the location of the *lingam* and the sun's centre i.e., yields local terrestrial latitude (viii) arithmetical progression (*अंकगणितीय वृद्धि*) and or mathematical symmetry (*गनितिक-सुमेल*) does not preclude geometrical symmetry (*जामिति-सुमेल*). And, numerous other aspects.

Solar Day; Earth Day & Khagola

From Arya Bhatta through Harihara Bhattacharya (author's ancestor) to Satananda *et al*., clearly talk about 'solar-day' & 'earth-day' i.e., sidereal i.e., nocturnal *alias* planet\star alignment & 24 hrs Sun shadow basis, respectively. Have not explained it as like use of any gnomon\device as if these basis requirements, well known, hence 'presence-assumed'. In a geo-centric plan there would have been mono. Terrestrially, there are 365 days due to spin effect alias *earth days* (time). As per *saharsalingam's* indications the earth moves along a non-circular 7^0 arc around the sun (360^0 i.e., space) in 365 days (time). A body moving along an arc of 7^0 will end up having an anomaly. In order to make the end points meet such a *gola* (circle) has to lyse and become *khagola* (neither ellipse, nor circle). *Khagola* phenomenon is not limited to earth-sun nexus, it extends to all luminaries (jyotisa) even beyond the planetary system which is reflected in contemporary schools of cosmology (*note - v*).

Space ÷ Time = Infraction (due *khagola* architecture) 360 ÷ 365 = 0.98630136 98630136 98630136 98630137……keeps enlarging! (*note -vi*)

Therefore, earth year and solar year differ in duration

The Indian national symbol is that of the Buddha's '*धर्म चक्र**Dharma Chakra'* (faith's roulette) which has 24 radians wherein each radian represent 3 *प्रहर**prahara* (ancient unit of time) of time and\or 15 deg., of the rotational arc. One *prahara* being of 20 minutes of duration the Earth spins on its axis by such order. We may note macro & micro units i.e., space-speed-time measurement! Thus, it is a unique member of archaeoastronomy (intangible heritage). By adopting the terrestrial 24hr cycle the Buddha simplified the complex for the faithful (simple folks). Else, the whole is loaded with the then best of science. In the Buddhist art of greater Asia the Dharma Chakra (all variants included) are noted from c.2nd BC towards the present.

Helio Centric Versus Geo Centric: Cultural History ~ Internal Evidences

A theory (in context to the above *Notes*) would be the best foot forward. The term *khagola* packs theories. Ideas have made *sanatan* evergreen & perennial (helped the civilization to remain in currency in continuum; while others rose and vanished). Periodization arises out of hypothesis\conjectures\ideas and end up as theories. The related mss., be the thesis. Thus we note 2 inter-corroborating thesis (i) *Āryabhaṭīya* (ii) *Surya Siddhanta*. Either are self-penned by the (apex) proponents. The phone '*आर्य**arya'* means sauvé\elite; '*भटटिआ'* means scholarly work\scholarship = elite scholarship or apex scholastic exercises. It is the *Surya Siddhanta* (Sun's Principles) document as in Fig-1 & 2 that is in focus in this *desideratum*.

The Gupta dynastic period of the Indian subcontinent has been held as the 'Golden Era' [35]. This dynasty's theriopomorphic symbol was the 'golden boar'. However, they had no regnal sovereignty over Kalinga [36] or the Deccan. *वराहमिहिर**Varahamihira* = 'boar sun' connotes as 'dazzling citizen' of the dazzling boar era/domain (a state granted metaphor). *Mihira*\Sun*मिहिर* was in the harness of the *वराह**Varaha* court (state sponsored scientist). The non-partisan ethos of the '*Surya Siddhanta'* (in either schools) is 'collective opinion', as it is a scientific document of very long period based nature study. In this paragraph we have talked about a mono subject, two identical captions, contrasting aspects, more than one author, variable periods, differing geo-political domains, academic attrition, and have hinted our feel via a rendezvous. This is a loaded hypothesis *alias* off-spin-1. *Surya Siddhanta* means 'Helios Principles' (principles of the solar system). It appears there were two confabulating schools that used the same term for contrasting objectives (i) Sree Varahamihira dated to Gupta

dynasty 4th-5th A.D., epitomized the 'Geo centric concept' (ii) and whereas our adduced members represents 'Sun centric concept' epitomized by Arya Bhatta, pre-dates *Mihira* & *Bhatta* and is also independent of the Gupta art-&-archaeological field remains. Furthermore, the *sahsralingam* (a pan India artifact) predates all by a wide margin; being most popular in Kalinga (Fig-8). Thus it may conservatively be averred that Harihara Acharya as another possible candidate of the 'Sun centric' collegiums and either being non-state sponsored scientists. He too was an '*आचार्य* \acharya' (professor) alike Bhaskara-I of the helio-centric school. This too is a loaded hypothesis i.e., off-spin-2 and it transpires out of in-situ scientific validation i.e., evidence based.

We raise the question why did the geo-centric concept become more popular? Our point is, a few important cellestial phenomena (*viz*., eclipses) could not be explained by the *Bhattiya* School. Moon was a planet and not any satellite. Eclipse phenomena were shadow belts in the sky which also were of variable intensity, length, in any hemisphere and often angled away from the zenith pass latitude (no central line); there was also the sub-phenomena of 'first-&-last contact'; umbra-penumbra; etc. Mythic characters *राहु* & *केतु* (*Rahu* & *Ketu*) fitted well (as if astronomical constants that could only happen if the Earth be at centre). Helio-centric mathematics relied on deep shadow lines on earth (terrestrial). Intuitive mathematics was helpless vis-à-vis the not known natural aspects. Terrestrial model was unfit for celestial phenomenon\s (eclipses) becaused by a spinning earth\sphere rotating around the Sun (Helio-centric planetary system). In geocentric planetary scheme the eclipses could be pre calculated. Pre-calculation was mandated also by altered faunal behavior, tide-storms-&-other meteorological events, human wellness, got to be dreaded, need to wash\dip-&-dunk bath, oblations, etc.). Forecast helped the faithful; social & religious needs; adherence became the more. There is no manuscript neither any *प्रथा* *pratha* (tradition) nor any *चित्र कथा**chitra katha* (hieroglyphics) indicating any counter from the *Bhattiya* school\collegiums (Fig-1 to 2 needs deep inquest). Silence from independent individual, the affected school\collegiums stalwarts and state sponsorship to Mihira led to a general support for the new concept & victory charade.

The general refrain is that Indians did not go to Greece to learn, it is the Grecians who visited India to learn-&-imbibe [37]. In Greece, geocentric concept replaced the (pre-existing) helio-centric concept around 1st A.D [38]. In India the geo-centric concept germinated in the Gupta court and had fanned out from their domain. The demise date of the pre-existing helio-centric concept can be set around c.550 A.D., (spearheaded by Mihira) and its retraction from pan India from c. 600 A.D., onwards. By such *datum* Arya Bhatta had demised and (best commentary provider of Bhatta's *magnum opus*) Bhaskara-I (c. 600 - c. 680A.D.) also did not emphasise any re-revision (state engineered gag?). The term *sahasralingam* or even (solely) the *lingam* is not alluded to by any. It is our experimentation based finding. The *siddhanta* literature-&-practice alludes only to '*दण्ड**Daṇḍa'* (staff) which is shown in Hindu apex temple art [39] & in temple, general ritual ephemeris. The *sahasralingam* is indeed a '*Daṇḍa'* (100% a shadow measuring staff), a pan India archaeological member of great reverence, permits numerical compassing of space-&-time in the beholder's lingua. Review is warranted from such perspective. This work thus is exploratory.

The alternative schools were also awaiting retribution. The distinction between earth day & solar day was erased (the fall point). Finally, the VIPs were to be effusively described as being shown upon and being waited upon by the sun-&-moon, which were circumambulating 'Him' - 'the lord of earth & heavenly possessions including the *विग्रह**vigraha*\non-entities\idols & the *ग्रह**graha*\planets i.e., *पुरूषोत्तम ब्याधि* *Purushottam* syndrome. For astronomy in India intractable down traction period set in. In courts and councils dwelled sycophants, as do they now. Gallous, greed & greasers also contributed to geo-centricity. Long term ramifications? Astronomy-&-astrology i.e., science -&-pseudo started getting merged (due socio-political factors {historical process}). Immediate ramification? The non-sponsored scientist, out-of-the Box thinking, young-&-enterprising minds and\or free-lance erudition if any were no match *vis-à-vis* the high paid state sponsored pseudo super-stars, etc., ~ as alike present day India. Groupism took ground. Clash in place of contest between free academics and state funded chairs also posits as eminent. Regionalism devolved into parochialism. Establishment had become the enemy of enterprise. All this happened between *c*. 800 & 1100 A.D.

Thereafter, post *c*. 1050 A.D., to checkmate the Crusaders the Jihadists (relatively resource less {desert & semi-arid dwellers}) looked deep into Indian sub-continent. Post *c*.1050, the sub-continent started experiencing military ingressions, depredating & dehumanizing incursions, willing-and-forced massive conversion to Islam (peace), recruitment, resource mobilization, etc., (historical process). Post fall of Constantinople (29-5-1453) Islam became *मुसलमान**musalman* (muscling) and settled down [40]. It was time for *पलायन**palayan* (flight). The neo Islamic powers were science disabled minds and fiddled not (brazen barbarians & proven illiterate is the general refrain). State sponsored DTR (desk top research) took a long vacation. Such lame duck geo-centric concept stayed put until the British Dominion administration overturned it around (in *प्राची*\Prachi\Orient). *However, helio-centric concept continued to be practiced by many and even Brahmagupta (c.7th A.D., Rajputana) seems to have swiveled his indulgence from geo-centric (Brahmasphuta) to helio-centric (Khanda-khadya), concept.* In the Occident, in *c.16th A.D.,* Nicolas *Copernicus had pioneered the return to the helio-centric concept.* Such be our considered viewpoints. The causative genesis of the geo-centric theory and the retraction & demise of the helio-centric concepts; the related *datums* & averments are our anecdote and historical internal evidence based summative distillates. So too collinear aspects as in (*note-vii*).

Collateral Member & Sites

This type of *lingams* (as in Fig-3) are also noted as *कोटि लिङ्ग* *Koti Linga* ($1x10^7$ indications) at Sri Vishwanath Galli (lane); again at *दससामेधा घाट* *Dasasamedha Ghaat* (Kasi, UP); along the Ganga Banks; and the Deccan (south of Narmada). Possibly the largest specimen of an *असटोतर-लिङ्ग* *astotara linga* (108 indications) is inside the temple of Sri Kaala Hasti, Chitoor Dist, AP. The largest number of

collected specimen of *sahasralingams* are within the precinct of Sri Virajaa Devi temple, Jajpur Dist HQ town, river Brahmani right bank (*उत्तर -वाहिनी \uttar-vahinee*), Odisa; Fig-8.

Fig 8: Author's exposed *in-situ*. Wide angle lens used. The cache of variants. Fig-3a alikes are the most. Distillate = our candidate's scale & architecture was most popular. Authentic. Location: Jajpur, Biraja Temple, Odisa, India.

Fig 9: An variant. Undated. Shows the whole of a *Sivalinga* (fact indicator) on triple seat representing 3 worlds (popular format). Abacus has 11 rows each having 91 indentures = 1001 a magic number.

Fig 10: Apex variant. *Astotara lingam* = 108 indications. Revered. c.650 A.D. Parasurameswar temple, front façade - *vimana*. Location: as in Fig-3a. Beholding palm leaf manuscripts. Ferried by *Bidyadharas* (scholarship repositors); ascetics; middle aged; flight pose; tight-nice trunk wear-bare torso. Identical giant size is worshipped at Sri Kalhasti temple, Chitoor dist, AP, India, Black granite. Out of bounds for non-Hindus.

Fig 11: Ashokan pillar with Lion Capitol. Rampur, Bihar, India. At best covertly a sun dial. Monolith. Overtly marks authority @ site i.e., state sponsored\sub-vented site. Image curtsey www with thanks.

Fig-9 to 11 gives a pictographic brief about the monolith pillars in the field archaeology of India. Provided for topical levity

Fig 12: Heliodorous pillar, Vidisha, MP, India. C.1st A.D. Presents 4-6-8-16 faces & circular cylinder with Siva's floral symbol as Capitol (*Borassus flabellifer*). Monolith. Covert purpose: Diurnal time & direction\space compass. No angle calculators. Fig-13 Kutub Minar, New Delhi, c.14th A.D. Poly block, load structure. Watch-&-ward tower. In-front (in dark) Gupta Iron pillar. C.5-6th A.D., clearly presents fractions and angle calculation markers (Theta operators).

Buddhist Cosmology

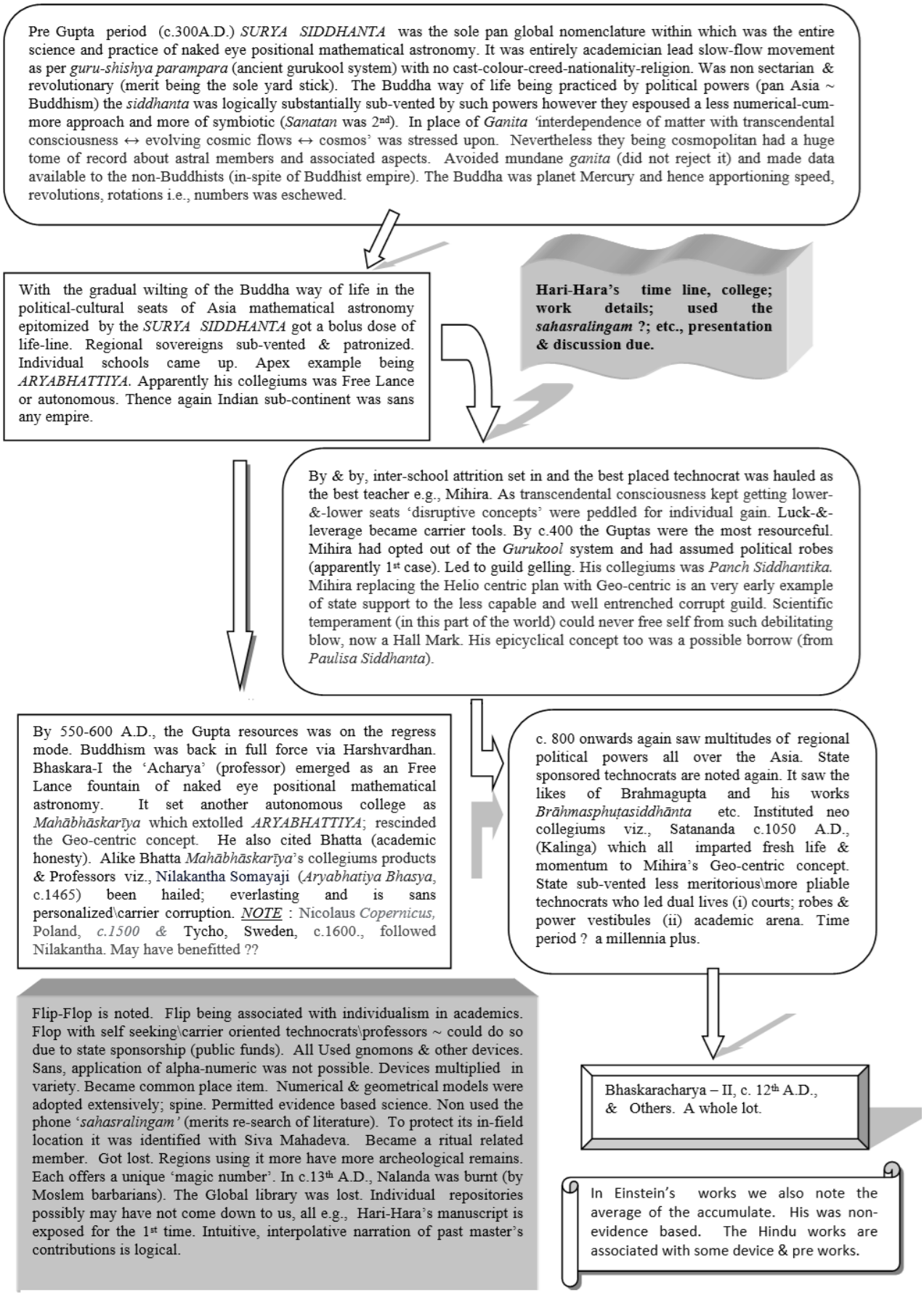
The *sahasralingam* is a megalith. The precinct being conserved by the Archaeological Survey of India since *c.*1903. It is an authentic ancient device [41-43] to evidence time in space and the architecture of space in relation to time (not merely equinox\solstice alignments). All megaliths are pillars. Odisa has a rich heritage also *vis-à-vis* tribal megaliths [44]. Pillars may be mono-block or poly block. Gnomonic pillars are monoliths. 'n' number of Ashokan pillars (of either types) with symmetric fractals litter the earth's cape (Hinayana & Mahayana period mints). Thus pillars in India have differing genesis & affiliations. *Sanatan siddhant vigyan* is in *Sanskrit.* The *sanatan siddhantims* were relatively much more sedentary than any other (specially compared to the Buddhist). The Buddhist were

greater masters of *Sanskrit*; were cosmopolitan - international groups, practiced inter-site and intra sub-continent migration and also indulged in exquisite pillars. The Buddhists were primarily natives of main-land India and super engineers. This means they were Math-Geometry enabled. Yet, any *sahasralingam* type 'Buddhist gnomon' has not been reported. And whereas, the *sahasralingam* is diminutive (chest height or less) compared to the specimens as at Stonehenge; Nile; Greece; Easter Island; Roman; Mauryan & Gupta, etc. Mahabalipuram rock-cut monolith (c.7th A.D.) are N-S oriented shore structures with mini shade space. The shores have burning sun. The astronomer of yore needed diurnal deep shade for recordings with minimal expouser to torrid-scorching conditions. Near doldrums eastern shore-board location yeomanly assisted visualizing of astrals-&-asterism\s until zenith pass. *audayaka* i.e., astral-rise & the *ratrika* i.e., nocturnal collegiums apparently operated here versatile metaphors e.g., 'Udayagiri-Ratnagiri' may be correlated. As compared to this, the Heliodorus Pillar - c. 113 B.C., Vidisha- land locked Central India, is huge (Maurya-Sunga size) and is associated as a Sun dial [45]. To our mind it was a '*Tala-dhwaj'* (Siva's insignia) cum *Surya -Yantra* (Sun Dial) & an excellent reference point valid for sub-continent wide application\citations due its central locus. Land lock locations offer less cloud Okta days i.e., more fair meteorological conditions annually, shores\coasts not as much (supporting info). At Heliodorus Pillar's neighborhood Mihira had sub-planted the Grecian geo-centric theory & *ratrika* practice. These hexagon-octagon-dodecagon- hexadecagon-or-plain cylindrical huge\life size pillars do not present the *rudra bhaga* (sun dome), sans abacus, sans shoulder offset, sans the evenly graduated CPT therefore are are non-*sahasralingam*. The Maurya\Sunga Lion Capitol pillars [46], the Buddhist apsidal architecture [47] are indeed associated with 'sun-dial' and 'Mercury', receptively (our current study - mss., on anvil). Nevertheless, the Buddhist delved in astronomy [48]. However, there is no conspicuous school\concept\treatise (material literature) as alike '*Surya Siddhanta'* in the Buddha domain nor any Great Masters as in *siddhanta* (although both be contemporary and lived amalgamated). In the Buddhist astronomical science\practices there was no First Cause, no creation of the universe (no *hiranya garbha* \ Big Bang) theory, etc**.** For the erudite Buddhist the cosmos or emergence of life therein was due the interdependence of matter and consciousness [49]. Mathematical treatise based dogged perusal is conspicuous by absence. If at all they had any as Free Lance out-puts they possibly lost all due to the burning of the pan-global library @ Nalanda. The *Pali sutras* 'common\ordinary maxims' composed by Buddha Ghosa *alias* 'intellectualism heralder' (dt to c.5th A.D., a contemporary of Arya Bhatta) whence he was @ *Mahāvihāra* at Anurādhapura, Sri Lanka. The maxims have extensive '*tikkas'* (commentaries) and '*artha-katha'* (explanations). They form the textual foundation of the erstwhile Buddha way of life (eventually progressed towards 'ism\dogma'). In these, the Buddha (via Ghosa's stylus) refutes various cosmological theories and discourages engaging in 'cosmological speculations' as 'irrelevant', 'unconceivable', 'metaphysics' hence 'futile' [50]**.** But then, the Hinayana-&-Mahayana pan-Asia archaeological remains indicate geometrical patterns (apsidal particularly) mimicking the epicyclical motion of Mercury during its 88 days of visibility in the western evening sky & 88 days in the eastern evening sky. Hence, the *viharas* face 'True West\East'; hill-top locations; etc., suggestive of being ancient 'observatories' thus were strong in astronomy and additionally the Buddhists were cosmopolitan and Sanskrit past masters (*note-viii*). Positional astronomy based (dour-drab-&-curt) mathematics and *sahasralingam* type (validating\accounting) device not reported.

We now discuss the phone 'Lanka' (*लङ्का*) in brief (with an in intention to report something). It could be Sri Lanka the nation which was all along associated with maritime\sailing activity and mariners use stars for path finding. Its Geographic center point being 7.8731° N, 80.7718° E provides a clear E-to-W night sky view, astral and sun's diurnal trajectories (rise-to-set) with a 'near equator' location\zenithal pass (hemispheric dome). This location also has very useful large nature observation rock massif of Sigiria (590 feet) and the 'Nalanda Gedige, etc. The atmosphere (in moist domains) becauses a refraction (parallax phenomena) which heightens the sensation of near overhead ~ useful. S.R.Sarma quotes Bhaskara-II (i.e., Acharya, c. 1114-85) and his work *Karanakutuhala* [51-52] and states that '*lanka'* has been interpolated as having 'terrestrial equator' location i.e., where 0° longitude and 0° latitude intersects (most ideal for naked eye positional astronomy). Such intersect is apparent if astrolabe is used\relied upon. Thus, Laṅkā is a Sanskrit technical term used in ancient Indian sciences such as Astronomy, Mathematics and Geometry *interalia* connotes as ideal\best observation locus or to mark the terrestrial location from where the readings were taken. Sri Lanka = apex observation locus for five Dharma yoga\ meditating pose with any\all the five Dhyani Buddhas.

History informs us that around c.250 BC Ashoka was the top-most emperor on the Earth. His only- daughter (Soosree Sanghamitra) of dame age & Sriman Mahendra (20yrs) were entrusted to Kalingiya mariners and sea faring ships for *Dharma vije* (faith's ascension) to Sri Lanka and SE archipelago requiring repeat to-&-fro. This connotes as preexistence of civil-lines, pan-global emperor standard flotilla, navigation practices, science, tools and mariners. A view point is that, post *Dhama vijaya* (colloquially as *beeje*) the faithful visited *Sigiria* i.e., *Lanka* to experience the rising & setting of Mercury *alias Lord Buddha* & by-&-by scholars to conduct experiments and returned to respective bases. At own base they offset the lat\long difference and announced the same as if readings\findings were same as locus Lanka. Few could afford the physical \ fiscal requirements for Lanka camp visit and few needed to do so it required mathematical erudition-&-skills and hence it must have been adding flying colours to the practitioners who could make any locale readings as if done @ Lanka. Lanka concept may be ancient Greenwich mean type concept. The terrestrial point of (Lanka concept) reference in relation to the local hemisphere, its unique methodology and compare with astrolabes (which are late members & non-Indian) has been presented-&-discussed by Bhattacharya & Naik [53].

Graphical Presentation of Socio-Political Mechanics of Sanatan Siddhant Vigyan



Periodisation & Sahasralingam

Everything in the cosmos evolved and hence study of evolution leads to segregation on the basis of time & place this leads to the creation of periods; etc. Mundane artifact based periodisation is known as Christian Jürgensen Thomsen's (*c.*1788-1865) 'Three Ages' scheme i.e., Stone, Bronze and Iron age and or the 'Six Ages' scheme *viz.*, Paleolithic, Mesolithic, Neolithic, Aeneolithic, Bronze and Iron Ages, respectively. The Greek way of life eventually led to the Occidental civilization. It had a school of

astronomy and initially delved in Sun centric that later swiveled to Earth-centric astronomy. It ranged between *c*.3000 B.C., to *c*.30 B.C and offers no periodisation (of the cosmos) nor any mathematics as in *siddhant vigyan.* And, c.3000 B.C., is the Bronze Age as per Christian Jürgensen Thomsen's scheme. Comparatively, the civilization in the *Prachi*\Orient is far more datum deep.

Every period had a unique name and each such unique period comprised of eons, great epochs & epochs which all in-turn were calculated in term of 'earth years' (terrestrial spin). And, such 'earth years' was also the unit for stating the number of rotation of the naked eye visible planets. Thus, a great epoch (*maha-yuga*) could be stated on the (a) basis of earth years (b) how many rotations the visible planets went through during the same period, Sun included. This is an amazing case of dual-axis accounting. Furthermore, the periods associated with the naked eye visible septa (7 astral members *viz*., Moon; Sun; Mars; Jupitar; Satrun; Venus & Mercury) was on the basis of rotations around the Sun by any respective member as recorded from (spinning-&-rotating) platform earth (Note: Mihira altered it to 'rotations around the Earth'). The angles of their 'epicycles' and planetary nodes were accounted for & debated upon (geometrically & numerically). Again, there were major & minor planets; each having variable speed in relation to space covered (namely: *sighra)* which was attributed to variable inter\intra-planetary gravity articulated as 'attraction/wind' (namely: *prvaha*). Any extra Indian\non-*siddhanta* schools drew blank. Possibly hence Arya Bhatta makes no mention of any competing schools. All extra *sanatan schools* were considered as 'juvenile' *alias 'paulisa'* i.e., non-competitors (*Paulisa* in Sanskrit ~ Paul in English). Hence, citation was uncalled for.

Let us continue. A eon (*kalpa*) comprised of 'great epochs' (*maha-yuga**s*) and fractions thereof. There were precise numbers for each category (of the fraction periods) permitting numerical calculations alluding to the genesis of the planetary system. The last 'great epoch' is comprised of 4 sub-periods namely *क्रता**krata*, *त्रेतेया**treteya*, *द्वापर**dwapara* & *कलि युग**kali*. We are in *kali yuga* (current times). These being in relation to terrestrial life the unit of the calculations being 'earth years' comprised of days. Each part or parcel had repetitive fixed numbers (spin-&-revolution) in relation to Sun light - centre point member. Such periodisation hides more than it reveals. For they include conscious talk backed by numerical elucidation about light, time, space, speed, differential speed, relativity, attraction (intra planet gravity), motion, spin\rotation, revolution, circular motions & infracted trajectories, terrestrial globe, celestial spheres (as good as modern astronomy). The and, all such matters are conspicuous by absence in the Grecian-Roman schools of astronomy.

Critical minds making comprehensive assessment with embedded agenda have concluded that Bhatta and Mihira did not author *Surya Siddhanta.* Either belonged to the *Siddhant School* (different collegiums). While Bhatta did not assail *Surya Siddhant* Mihira did. Mihira only did a redaction (in his *magnum opus* the *Pancha-siddhantika*) and also replaced (i) helio-centric concept with geo-centric and (ii) nocturnal observation with diurnal. *Interalia*, by Mihira's time numerous recensions and recessions by many stalwarts all with the identical caption '*Surya Siddhanta'* were ruling the roost a case just, alike the *Ramayana**Mahabharata**Bhagavad Geeta**Vivah Shardha paddhati*, etc (*note-ix*). Mihira's redaction was a inter-school & inter-collegiums compare-&-contrast *desideratum*. Hari-Hara's mint (Fig-1 & 2) when viewed with such kaleidoscope posits as a full length work. Whereas, Mihira select picked parts & parcels. Therefore, Mihira cannot be credited as one of the primal contributor of '*Surya Siddhanta'* (*note-x*). Whereas, Hari-Hara possibly can be (work due). Nevertheless, for the 1st time it is Mihira who in his treatise the '*panch siddhantika'* [54] (*penta* schools of astronomy) altered the practice of nocturnal observation to diurnal. He also mentions that on his *datum* there were three *sanatan-siddhanta collegiums* (*Vasistha siddhanta* being included not indicated). One was the '*Paulisa siddhanta*' (Greek school'), another 'Romaka *siddhanta*' (Roman school) and the 3rd - to 5th being that of *sanatan siddhant vigyan* (the term '*sanatan'* is not mentioned, it creeps in much later period and the term 'Hindu' stands at full discount). The Indo School went by the name "*Surya Siddhanta´* (Helios Principium). There was a galaxy of *acharyas* (professors) specializing in it. Clearly, alone the *sanatan-siddhanttims* knew about space-time-motion-&-light in the Cosmos. Alone they used alpha-numerical as their co-linear expounding language (Sanskrit being the alphabetic). Post Mihira again the *sanatan-siddhanttims* seem to discount the mention of '*Paulisa siddhanta*'. The Sanskrit ethos equivalent of 'Paulisa' being 'petty-simple-juvenile' *alias* 'paul-&-pavlos'.

Sanatan siddhant vigyan yugabda i.e., time frame periodisation terminates at *कलि युग**kali*. The science-&-practice of periodisation continues. The period Kali comprises of Paleolithic, Mesolithic, Neolithic, Aeneolithic, {Stone Age upto here} Bronze and Iron sub ages respectively. Our present-running time is bracketed as 'Iron age'. The lower & the upper datum of the Stone Age (pan global) period variably ranges between 3.5million - 6000; Bronze age to between 6000-3300 years before present (Greece's civilisation's beginning), respectively; and Iron Age thereafter (modern\archaeological scale). Now, as per siddhantik scholars *Kali yuga* commenced at the stroke of mid might on datum 18-02-3102 BC i.e., 5137yrs before present which coincides with mid bronze period (and whereas bronze age is bracketed numerically, fluidly). 5137yrs ago beasts & barbarians roamed all over Europe & the Americas. Lord Sri Krishna's appearance is calculated as 5294yrs before present i.e., *Dwapara* by oriental\astro method. The same works to Bronze Age (end) as per modern\archaeological scale and somewhat about to Greek civilisation's by historical scale. Looks fine.

However, in the theological-tradition domain *Ramayana* takes place during the *Treta Yuga*. The *siddhantic* time separation for the *Treta* is of the order ranging 800,000 years -to-2million years, before present. The homosapiens appeared on Earth 2 million years before present. Thus, some convergence or acceptability is discernable only upto *Kali yuga*. Thereafter, the *yugabda* (period theory) sails forth solo to describe the time in space (not age). Any congruence with Hindu mythic traditions stands loudly infracted. And, space\Cosmos for that & those bygone minds was '*anadi-&-ananta*' (sans beginning & endless) ~ Arya Bhatta 3.5. Therefore, the *yugabda* - 'period theory' was meant for retro calculation of the planetary\solar system's age, calculate motion; etc., for forward brain storming using various editions\formats of versatile gnomons like the *sahasralingam* to do number

crunching. The *yugabda* - period theory was not for ecclesiastical nor religion and neither for any idol valuation\ weightage purposes. The *sahasralingam* was so essential a device (& so many variants existed-&-permitted identical work-&-conclusions) that it was common place and needed no special mention. No such averment is noted vis-à-vis the Greco-Roman-Persian schools. Late Indian literature also does not indicate any *sahasralingam* type as a gnomon or time device [55, 56].

Pre to Bhatta the *yuga* periods of the current *mahayuga* had an arbitrary duration of 4:3:2:1 ratio of Earth years ~ an early example of mathematical\geometrical regression in nature (well known). Bhatta apportioned equal periods to all the 4 *yuga*(s) which is a case of optimization with homogenization (Canto 3.5). Not reported in Occidental positional astronomy even on c. 1850. Space equanimity and continuity of time is *siddhanta's* thesis; spin of the globular earth is the needle and the fixed sun as the thimble, respectively (what then was the experimental tool?). 'Danda' off course (Fig-3 like device). Non-mention of such mundane stone\wooden pillar was the common-minimum-assumption & practice. Astronomy (number crunching) was the brain-storming arena in the *Prachi* & all fun (way-of-life). In each of these high points of *siddhant vigyan* (naked eye positional astronomy) mathematics - geometry included - is the spine which in turn transpires off unique man-engineered gnomon called '*shasralingam'*. The numbers however large were derived by operating the gnomon called '*sahasralingam'*. Thence, in the Occident at the wheels of astronomy were 'paul-&-pavlos' (small-&-mini brains).

At canto No. 4,6 Bhatta says (*Bhugola: sarvatra bruta*) 'globular earth is equal in all directions". It means, such schools\ minds were aware of mankind\life\schools elsewhere, and those (competing) elsewhere minds were of 'no-match' with that of the *sanatan's* and more specially vis-à-vis the *siddhantim's.* Peerless Sanskrit being 'self-gelling' i.e., '*sanskrit'* permits (grammatically correct) usage as per will, in a boundary less manner. Sanskrit is a technical language. The *siddhantims* were erudite sanskritists and had a (proper) seat for all. Thus on the basis of information-&-learning (such schools\collegiums) had consciously apportioned a belittling adage e.g., '*Paulisa siddhanta*' (juvenile school of astronomy).

Yuga	**No of Years**	***Sahasralingam*\ Gnomon Constant**	**Result**	**Ratio?**
Krta-yuga	14,40,000	÷ 1020	*1411*.764705882353	4 times that of Kali yuga
Treta -yuga	10,80,000	÷ 1020	*1058*.823529411765	3 times that of Kali yuga
Dvapara-yuga	7,20,000	÷ 1020	705.8823529411765	2 times that of Kali yuga
Kali-yuga	3,60,000	÷ 1020	352.9411764705882	1 - The Kali.
Total	43,20,000	÷ 1020	4235.294117647059	Surya Siddhanta Ratio

Remarks

(i) Each of the dividends are very close to the initial 3 or even 4 digits. Highlighted & *italicized.*

(ii) pre Bhatta's *yugabda* ratio of 4-3-2-1 is noted

(iii) The ratio between the Total & the *yugas* (from Top) works out as 3-4-6-12 of any volume OR 1/3rd - 1/4th - 1/6th -1/12th of an arc OR 30% - 25% -15% - 7.5% of an Qudrasphere, respectively.

(iv) The progression between such ratios works out as 1.3; 1.5; & 2 which is useful in measuring angles i.e. Theta operators e.g., epicycle conjunction arcs; node angulations; in relation to Earth centre; etc, concepts = algebra & trigonometry.

Conclusion: Mathematical symmetry, its use as a rendition language is the spine & common in the case of time in space and the architecture of with Sun light as the vector = natural. Our *sahasralingam* & its 1020 magic number be the keys.

How is our *sahasralingam* (Fig-3) irrefutably be connected with accounting the *yugabdas* i.e., space & time? This necessitates a validation exercise with the 'magic number'. Our adduced *sahasralingam* offers the number 1020 as the magic number (51 indentures\upa linga x 20 rows) etched on it. It offers the unique ratio of 4-3-2-1 and hence is pre-Bhatta member (authentic & ancient). Magic numbers are constant in nature. The minds in this part of the world had worked to such magic number (there are variants even in the locale ~ Bhubaneswar). Making a device that could help in evidencing nature was the crux of the problem solved. It is a gigantic step as such devices\artifacts have not been reported from outside the Indian sub-continent. The *sahsralingam* is a peerless piece of unique engineering that permitted the minters and user of this device to arrive at astounding transpirations with number crunching and evidence mathematical symmetry that nature be.

Periodisation in ancient Indian astronomy appears as an ancient hobby turned into science or science turned into hobby wherein cerebral was the plough; space was the field; numerical matrix was the game and symmetry was the crop (as in modern times). And, they did all this in the beholder's language. Last but not the least, the siddhantims in general make no mention of any God head\divinity\faith save & except the proutist statement (translation) 'astronomy is the highest science'.

Einstein *Surya Siddhanta - Sahasralingam*

The way of life in the *Prachi* led to the *sanatan savyata* (perennial\eternal civilization) with *siddhant vigyan* as its apex science wherein the amazing high points are (i) periodisation of the Universe (ii) astronomical constants. Einstein's was Cosmological Constant i.e., non-expanding universe, in place of 'astro' (pre c.10th A.D., term) he preferred the term 'cosmo' (c.19th A.D., term) (iii) mathematics, geometry & trigonometry as the alpha numeric languages. These branch trio of the basic sciences were used to enunciate the amazing theories of (iv) time in space (v) relativity between the either AND (vi) planetary\astral motion & attraction i.e., gravity of modern period, respectively (vii) time-&-motion behave differently in different circumstances = relativity (viii) in space there are no up-or-down sides. Etc., [57, 58]. Mihira & his school did not alter (i), (ii) & (vii). Remained un-altered in India.

Historically, the best of astronomy science ruled roost in Asia say from c.300-to-c.1500 A.D., and in Europe from c.1500-to-c.1950. Thereafter it has shifted to N America. Scientifically, the *siddhanta* Universe was 'globular'. Period

theory includes '*manu\manavantar*' (intermission) of larger numbers; time glides away from moment '*Hiranyagarva'* (golden womb\Big-Bang) in units of *yuga* which keeps reducing; 'Big-Bang' retaining relevance. For the former we may (indulgently\for prospecting additional work) think as 'expansion' and for the later as 'deceleration' and the *sahasralingam* as the possible gnomon. Einstein theorized a 'constant size'; shored up his theory with 'universal constant'; used no device (entirely paper work). Post Einstein the USA has proven that the Universe is expanding and also decelerating and 'Big-Bang' (*Hiranyagarbha*) as the genesis point. The *sahasralingam* is quite helpful for such objectives. Modern astronomy (2024) is in consonance with *Surya Siddhanta* (a cache of cues). The *sahasralingam* seems to talk all this - is our distillate. Ref., 57 was a possible strong cue for Einstein's 'space-&-time relativity' theories. When Einstein went to US he was hailed as the 'giver' of time as the '4th dimension' (mostly by a community). Apparently hero worship &\or crowd engineering. Internally holds, infructuous. History means 'connect'. Our discussions are intended as possible internal evidence of historical connect.

Conclusion

(1) *Sanatan siddhant vigyan* ~ perennial principled sciences which also gels as 'eternal theoretical\logical sciences' (2) *Sanatan siddhant vigyan* is exclusively naked eye mathematical positional astronomy be it Helio or Geo-centric concept (3) Our Fig-1-3 can only visualize the Helio centric and cannot visualize Geo-centric phenomena concept (4) Helio-centric altered to Geo-centric concept via the stylus of Varaha Mihira in the court of the imperial Guptas ~ c.550 A.D., (5) hence, Fig. 1-3 pre-dates Mihira ~ c.550A.D., (6) the Helio-centrism in-general was articulated as '*Surya Siddhanta*' = "Sun-theories" and was 'diurnal practce'. It represented a pan global school\scholastic domain (with present India domain as HQ) and not any department, faculty, caption, neither any individual or work (7) such diurnal practices can be done using the *sahasralingams* (8) Fig, 1-3 are token representation of the large varieties of *sahasralingams* (9) these are scientific devices (10) are ancient gnomons in this part of the world however are not mere clocks. These type gnomons are meant to study earth-sun nexus (11) pre-dates the equally developed modern gnomons by an order of 1-to-2 millennia (12) each device at shoulder level has a equi-spaced etched circular offset on it for sun-shade rotation reading - shade was not read on the ground (13) this is a 'circular plane table' CPT at plum in the open - as in field survey (14) each *sahasralingam* also behold a magical number in the format of an abacus (15) thus are versatile mathematical tool (16) assists in factoring time, space & Earth-Sun trajectories numerically (17) can be used numerically to state the 'period theory' i.e., *yugabda* and all the large numbers that are associated with Sun-Earth motions (18) such 'theory {*siddhanta*}' means space-@-time and time-in-space i.e., 'earth-day', 'solar year', variable motion, etc. (19) that the Sun was the sole-constant time unit (light speed) i.e., sole time vector (20) that the Earth's orbital path is @ 7^0 angle (& not 10^0) i.e., infracted orbit alias *khagol* stands explained & evidenced with a plethora of other applications & findings (21) among which the 2-in-1 annual shadow periods is a key finding (22) the CPT is a genius of a product and amazing engineering with absolute brevity. Pan globally peerless (23) It translates the observations into digital conversion in the beholder's language (24) the cosmic ratio of 4-3-2-1 between the *yugas* is begot by operating our *sahasrlingam* (25) permits repetitive experimentation, evidence generation & numerical statements (26) speaks via *hieroglyphics* i.e., universal i.e., beholder's language (8) application of modern mathematics possible (28) each device unravels\presents gigantic numeric-geometrical treaties ~ सम्हिता. Each *sahasralingam* is an whole edition, a variant and represents an apex scholarly manuscript of past times & minds (29) permits poly axial inferences with definite outcomes due the on-rolled abacus ~ makes mathematics a joy (30) apparently was the tool of the ancient *siddhantims* (31) is a megalith - man engineered monolith; offers no similarity with the Ashokan Lion Capitol pillars (32) the Buddhist apsidal architecture are associated Mercury's revolution however no similar device has thus far been reported (33) the concept, mathematics, art, engineering every aspect-&-detail of the *sahasralingam* are innocuous while applications are amazing, the ramifications are mind-boggling (34) Periodisation as a concept & practice under the Indian sun is old hat. Mathematiocs & geometry being its language and the CPT being the brain (35) pan globally peerless i.e., mankind's heritage (36) are members of History of The Sciences (38) non-religious i.e., Secular (39) this study is exploratory and merely creates wide windows for the young & the enterprising (40) this is nascent work and hence seeks mere discussion.

Save-&-except multi-disciplinary discussions we do not propose any theory far apart revisionist. The term '*kalinga'* means 'cleaver & cunning' [59]. Being a native of erstwhile heartland Kalinga, our model is *kalingiya*, i.e., the layout is an intermesh of heuristic hypothesis and pedagogy (unintentional sweeping statements if any be set aside). Our experiments, interpretations, interpolations & averments are nascent and 1st time\ground breaking. The *sahasralingam* is code locked. In breaking the code(s) lies joy unbound. In getting to these findings we feel blessed and hasten to mutter "*Om Namah Sivaya*" (hail the fact\salutation to facts).

Acknowledgment

To my fore-fathers who all were erudite members of the 'House of Siddhanta' and labeled self as 'sanatanees' and held the term 'Hindu' at a distance with disdain. To, the last most nebulous being my revered father's elder Swami Krupananda "Saraswati" the sole 1st student of Pandit Madan Mohan Malviya 'The Mahanama' (BHU-Kasee) who had decorated Sri Krupananda (Ekamra neebasee) with such title & who in turn had presented his working Table & Almirah to this author. Bhattacharyas - Ekak Sasana Brahmana, Bentapur village, Block Brahmagiri, Dist Puri. Monastery (muttha) Ganga Mata, Sri Jagannath Dham.

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Notes

Note I: The layout of the Benaras Hindu University, Kasi, UP, India represents the hemisphere of the sky dome. The main Entrance Gate and is known as "Lanka" = best observation locus or entrance into the domain of knowledge. (BHU represented *siddhanta sarawat*).

Note II: Ancient script. Vocabulary & terminology rich Language ~ very wide spectrum. Completely independent of Sanskrit. Has the 2nd largest Lexicon (*Gyana Mandala*) after the *Sabda Kalpa Drum*. Plus hundreds of palm of manuscripts pertaining to sciences in this vernacular. Inline be our caption & citations.

Note III

Matsya Purana stands at the top of the 'lore' list in the Deccan. *Brahma Purana* (Cosmos lore) in north India. Thus, there were and be 'schools of rescension\s', which in turn was economic support based coming down the time line as geography delineated.

Note IV: Intra planetary attraction-gravity; Relativity of time; etc., were explained by Einstein using algebra. Trigonometry came to Europe around II world-war or even after. Einstein was awarded The Noble (1905) for paper (a) "Photo Electric Effect". Thereafter he wrote (b) Special Theory of Relativity & (iii) General Theory of Relativity. In all these three he used 'algebra'. *Siddhanta* was his cue?

Note V: By adopting the term *khagola*, did the ancient mind mean that earth's orbit is not fixed so also the architecture of the Universe! A perfect circle is grid-locked phenomena an ellipse is due extra mural effect.

Note VI: In relation to time in space, time on earth shall need tweaking forever.

Note-VII: Kalinga heartland has numerous Buddhist sites. The site at Bhubaneswar (atop Kumari Parvat) and that of Ratnagiri are apsidal, face True East and also double up as observatories\higher education centers. The Bhubaneswar site also has Sanatan-Sidhhanta vestiges (subsequent communication). Any astral body and more specially Mercury's motion in the sky appears as apsidal to the naked eye - due to Sun's gravity. Such apsidal precession (angled) got reflected in the apsidal architecture of the Buddhist sites (glaring unique case of archaeoastronomy). Each seat in the Buddhist apsidal stupa marks the observation point of an epicycle of the mercury in the sky and also special\interesting astral events. Thus mathematics & geometry was involved. Its existence & practice has been denied. Mercury being Buddha's asterism. As per Buddhist cosmology in *Tripitaka\Therevada\Pali sutras* the Buddha on *mahaparinivana* proceeded higher to Mercury due to 'interdependence-&-confluence of matter and positive consciousness'. This planet's apsidal precession around the sun in a elliptical orbit thus became the cue for the apsidal *stupas*, *viharas* & *chaitis* which were also multi-disciplinary observation-study seats\centers\locations. Thus meta-physics via Dogma stands underscored (contrary to Buddha Ghosa). Internal historical-&-archaeological evidence. *Siddhanta* until state sponsorship (award for fudge-&-fob or for mediocre work) to Mihira was bereft of meta-physics via Dogma.

Note VIII: Co-relate with the averments as are under heading 'Buddhist Cosmology'.

Note IX: Around 20 siddhantas can be noted with easy: Surya; Pitamaha; Vyasa; Vasistha; Atri; Parasara; Kashyapa;Narada;Garga;Brighu;Marichi;Manu;Angira;Lomasa;Paulisa;Romanka;Yavana;Chyavana etc. Within such schools were collegiums comprised of a galaxy of brilliant minds held in memoriam due the seminal contributions of individual stalwarts.

Appendix - I

Apart from our 'citations\references' and 'Notes' scholars may note that there are a many invaluable lonesome documents with the Title "*Surya Siddhanta*" which all remains to be factored in. Herein below is an indicative list. Jointly makes up a (select-mini) Bibliography on *Surya Siddhanta*.

- *Surya-siddhanta-vivarana* (1432) by Parameshvara of Kerala

- *Surya-siddhanta-vivarana* (1572) by Bhudhara of Kampilya
- *Surya-siddhanta-tika* (1178) by Mallikarjuna Suri
- Burgess Ebenezer, (1858-60). Translation of the Sûrya-Siddhânta, A Text-Book of Hindu Astronomy; With Notes, and an Appendix, Journal of the American Oriental Society, Vol. 6, pp. 141-498. https://www.jstor.org/stable/pdf/592174.pdf
- *Surya-siddhanta*, 1859. Asiatic Society of Bengal - https://indianculture.gov.in/rarebooks/collection-oriental-works-surya-siddhanta-ancient-system-hindu-astronomy-ranganathans (East India Company Funded)
- Suryasiddhanta with bhashya of Candelvara (Astronomy, Sanskrit) 12th century AD, Asiatic Society of Mumbai - Library, https://asiaticsociety.org.in/index.php/holdings/manuscripts/34-manuscripts.
- *Surya-siddhanta-bhashya* (1185) by Chandeshvara, by a Maithila Brahmana. (Recension).
- *Surya-siddhanta-tika* (date unknown) by Kama-bhatta of southern India.
- *Surya-Siddhanta* - anonymous. Palm Leaf Manuscript, Mythic Society - Bangalore, https://mythicsociety.org/manuscripts
- *Yukio Ôhashi (1993). "Development of Astronomical Observations in Vedic and post-Vedic India". Indian Journal of History of Science. 28 (3).*
- K. V. Sarma (1997), "*Surya Siddhanta*", Encyclopaedia of the History of Science, Technology, and Medicine in Non-Western Cultures edited by Helaine Selin, Springer, ISBN 978-0-7923-4066-9
- *Yukio Ôhashi (1999). "The Legends of Vasiṣṭha - A Note on the Vedāṅga Astronomy". In Johannes Andersen (ed.). Highlights of Astronomy, Volume 11B. Springer Science. ISBN 978-0-7923-5556-4.*
- *Surya Siddhanta*, Kedar Nath Sukla, Indian Council of Historical Research, Call No. 520.954SHU 92-S. Hindi.

Co-relate with Note-IX

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