

How Sacred Geometries Embody Structural/Dynamical Parameters of the $E_8 \times E_8$ Heterotic Superstring & the Codon Pattern of DNA

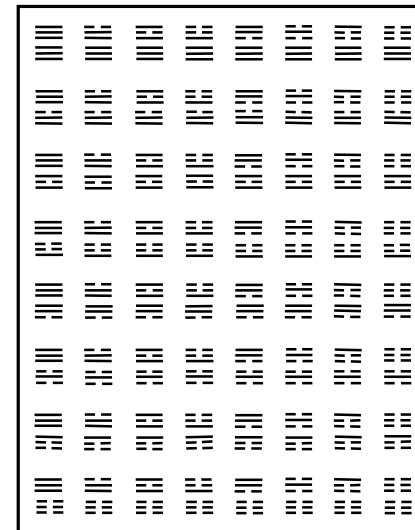
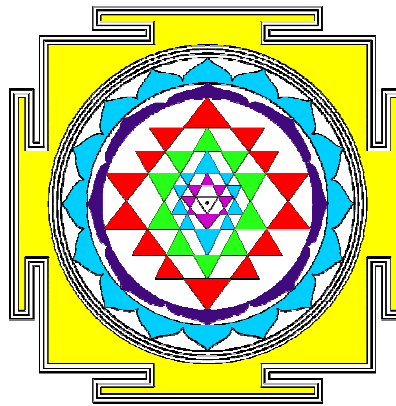
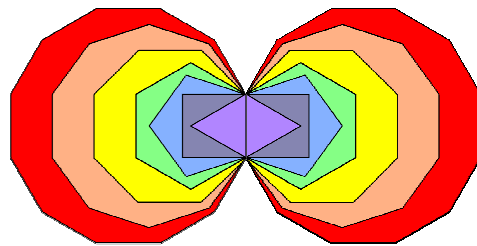
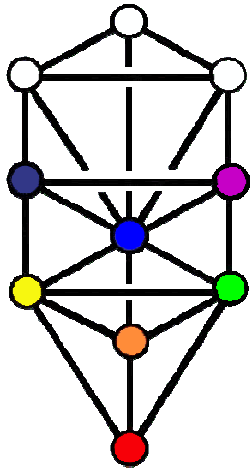
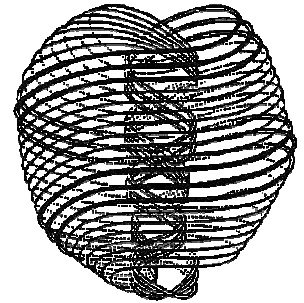
by

Stephen M. Phillips

Flat 3, 32 Surrey Road South. Bournemouth. Dorset BH4 9BP. England.

E-mail: stephen@smphillips.8m.com

Website: <http://smphillips.8m.com>



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Part 2

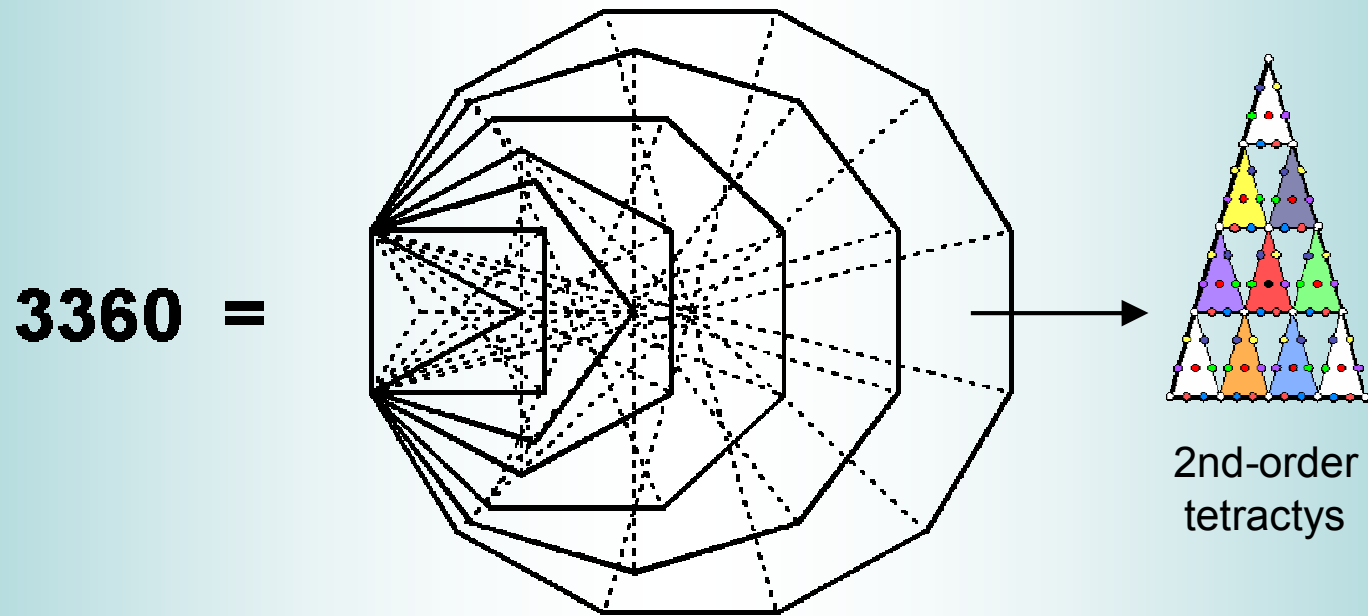
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	SEPHIRAH	GODNAME	ARCHANGEL	ORDER OF ANGELS	MUNDANE CHAKRA
1	Kether (Crown) 620	EHYEH (I am) 21	Metatron (Angel of the Presence) 314	Chaioth ha Qadesh (Holy Living Creatures) 833	Rashith ha Gilgalim First Swirlings. (Primum Mobile) 636
2	Chokmah (Wisdom) 73	YAHVEH, YAH (The Lord) 26, 15	Raziel (Herald of the Deity) 248	Auphanim (Wheels) 187	Masloth (The Sphere of the Zodiac) 140
3	Binah (Understanding) 67	ELOHIM (God in multiplicity) 50	Tzaphkiel (Contemplation of God) 311	Aralim (Thrones) 282	Shabathai Rest. (Saturn) 317
	Daath (Knowledge) 474				
4	Chesed (Mercy) 72	EL (God) 31	Tzadkiel (Benevolence of God) 62	Chasmalim (Shining Ones) 428	Tzadekh Righteousness. (Jupiter) 194
5	Geburah (Severity) 216	ELOHA (The Almighty) 36	Samael (Severity of God) 131	Seraphim (Fiery Serpents) 630	Madim Vehement Strength. (Mars) 95
6	Tiphareth (Beauty) 1081	YAHVEH ELOHIM (God the Creator) 76	Michael (Like unto God) 101	Malachim (Kings) 140	Shemesh The Solar Light. (Sun) 640
7	Netzach (Victory) 148	YAHVEH SABAOTH (Lord of Hosts) 129	Haniel (Grace of God) 97	Tarshishim or Elohim 1260	Nogah Glittering Splendour. (Venus) 64
8	Hod (Glory) 15	ELOHIM SABAOTH (God of Hosts) 153	Raphael (Divine Physician) 311	Beni Elohim (Sons of God) 112	Kokab The Stellar Light. (Mercury) 48
9	Yesod (Foundation) 80	SHADDAI EL CHAI (Almighty Living God) 49, 363	Gabriel (Strong Man of God) 246	Cherubim (The Strong) 272	Levanah The Lunar Flame. (Moon) 87
10	Malkuth (Kingdom) 496	ADONAI MELEKH (The Lord and King) 65, 155	Sandalphon (Manifest Messiah) 280	Ashim (Souls of Fire) 351	Cholem Yesodeth The Breaker of the Foundations. The Elements. (Earth) 168

The Sephiroth exist in the four Worlds of Atziluth, Beriah, Yetzirah and Assiyah. Corresponding to them are the Godnames, Archangels, Order of Angels and Mundane Chakras (their physical manifestation). This table gives their number values obtained by the ancient practice of gematria, wherein a number is assigned to each letter of the alphabet, thereby giving a number value to a word that is the sum of the numbers associated with its letters. Some of these numbers will be referred to in the article.

Figure 1

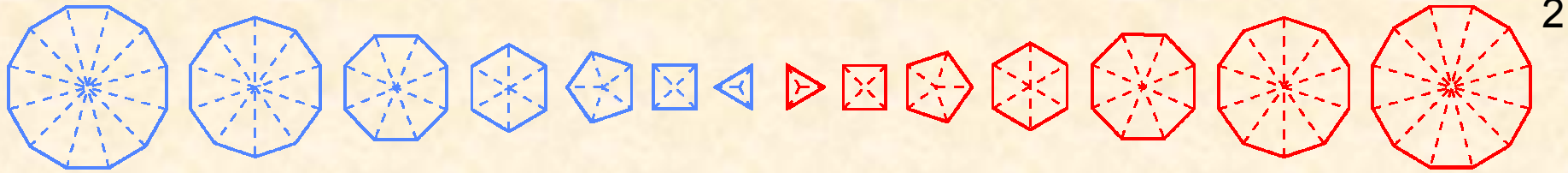
When the 47 sectors of the seven enfolded polygons are transformed into 2nd-order tetractyses (the next order above the tetractys in which yods are replaced by tetractyses), they contain 3360 yods. This is the number of helical turns in all ten closed curves of the $E_8 \times E_8'$ heterotic superstring when they revolve once around the spin axis of the spin- $\frac{1}{2}$ particle. Each yod denotes a turn. Physically, it is an oscillation of the circularly polarized standing wave running around the curve. The Godname ELOHIM with number value 50 prescribes the fundamental constituent of quarks because its ten whorls make 50 revolutions, each of 336 turns, about its spin axis. Assigning this number to each of the 336 yods in the first (6+6) enfolded of the inner Tree of Life generates the number 16800 as the number of circularly polarized oscillations in all ten closed curves of the heterotic superstring.



All ten closed curves of the $E_8 \times E_8$ ' heterotic superstring wind 3360 times in one revolution around its spin axis. This is the number of yods in the seven enfolded polygons of the inner form of the Tree of Life when their 48 sectors are each turned into 2nd-order tetractyses. It is astounding evidence that the superstring is the microscopic manifestation of the universal Tree of Life blueprint.

Figure 2

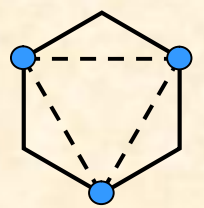
The seven separate regular polygons of the inner Tree of Life have 192 vertices, edges & triangles. They correspond to the 192 lines & broken lines of the 64 trigrams in one half of the I Ching table. The 192 geometrical elements in the second, identical set of seven polygons correspond to the 192 lines & broken lines in the other half of the table. The 24 lines & broken lines in the upper trigrams of the eight diagonal hexagrams correspond to the 24 vertices, edges & triangles in the hexagon, which is the halfway stage in the sequence of seven polygons. The 24 lines & broken lines in the lower trigrams of the eight diagonal hexagrams correspond to the 24 vertices, edges & triangles in the hexagon in the second set of polygons. Each of the 384 lines & broken lines of the I Ching table therefore symbolises a geometrical element composing the two sets of polygons of the inner Tree of Life. This is compelling evidence that the I Ching table is — like the inner Tree of Life — a representation of the same universal blueprint. The counterpart of the yin/yang polarities of lines and broken lines is the distinction between geometrical elements defining the boundaries of polygons and their internal elements, in each case there being 192 in each class.



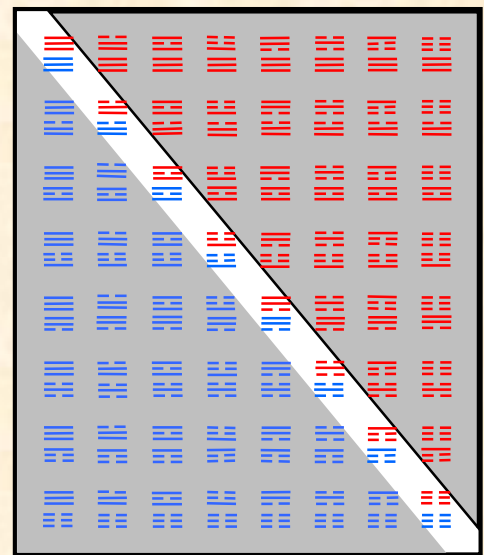
Number of corners = 48
 Number of edges = 96
 Number of triangles = 48
 Total = 192

Number of corners = 48
 Number of edges = 96
 Number of triangles = 48
 Total = 192

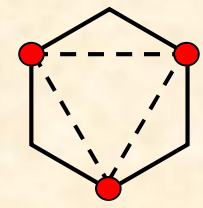
96 ———
 96 - - -
 Total = 192



3 vertices + 21
 geometrical elements



96 ———
 96 - - -
 Total = 192

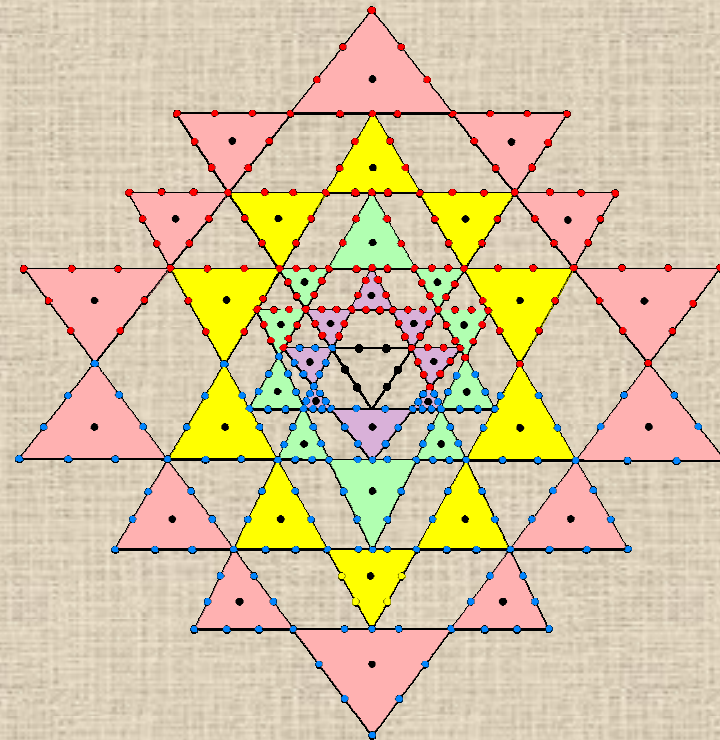
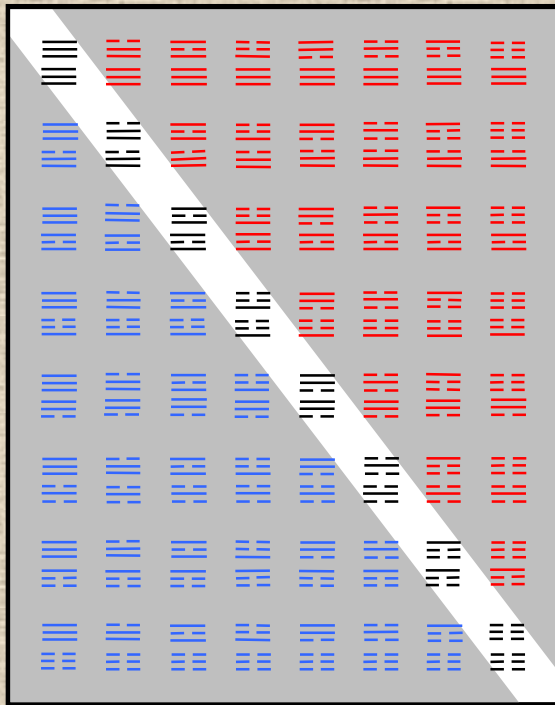


3 vertices + 21
 geometrical elements

**The 384 lines & broken lines of the I Ching table denote the 384
 geometrical elements composing the inner Tree of Life**

Figure 3

The 384 yin/yang lines of the 64 hexagrams of the I Ching table correspond to the 384 yods in the 42 triangles of the 3-dimensional Sri Yantra. The (24+24) yin/yang lines in the eight diagonal hexagrams correspond to the (24+24) yods that are either hexagonal yods in the central tetractys or centres of the 42 tetractyses surrounding it. The six hexagonal yods in the former are the counterpart of the six lines in the pair of heaven trigrams in the upper left-hand corner of the table. The 168 yods on the 63 edges of the 21 tetractyses in each half of the Sri Yantra are the counterpart of the 168 yin/yang lines in the 28 hexagrams on each side of the diagonal. Their physical manifestation are the 168 circularly polarised oscillations in half a revolution of each whorl of the $E_8 \times E_8'$ heterotic superstring.



168 — & - -

48 — & - -

168 — & - -

168 ●

48 ●

168 ●

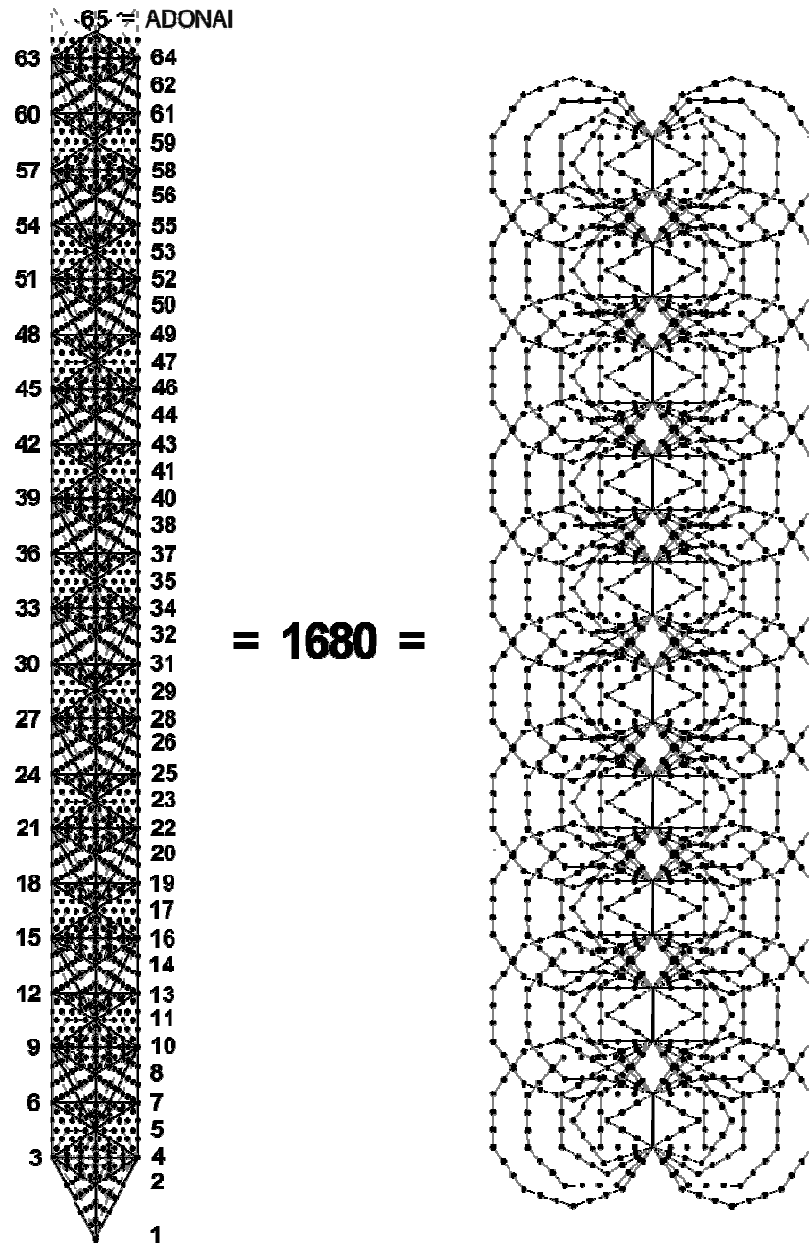
The correspondence between the I Ching table and the Sri Yantra

Figure 4

ADONAI, the Godname of Malkuth with number value 65, defines the lowest ten Trees of Life because they have 65 Sephirothic emanations. EL, Godname of Chesed with number value 31, prescribes them because they have 127 triangles, where 127 is the 31st prime number. When their sectors are turned into tetractyses, there are 1680 yods below the top of the tenth tree (the 65th emanation). This is how ADONAI determines the superstring structural parameter 1680. They belong to 131 tetractyses, where 131 is the number value of *Samael*, the Archangel of Geburah.

The first (6+6) polygons enfolded in each tree constitute a holistic system because their properties are prescribed by the Godnames of the ten Sephiroth, e.g., ELOHIM, the Godname of Binah, prescribes them because they have 50 corners. When each of their 70 sectors is turned into a tetractys, there are 1680 yods lining the 600 edges of the (60+60) polygons enfolded in the 10 trees that are intrinsic to them in the sense that none of them belong to polygons enfolded in the next higher tree.

Just as the 1680 helical turns of each whorl in the heterotic superstring define its form, so the 1680 yods on edges of the polygons determine their shape. A whorl is a Tree of Life in itself, being the microscopic manifestation of a Sephirah, and therefore can be represented by ten Trees of Life.

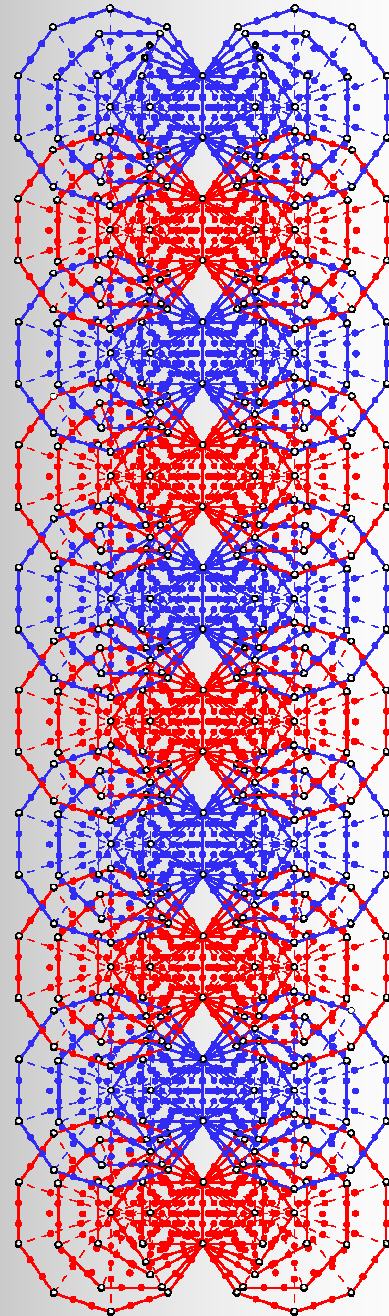


Below the top of the 10th Tree of Life prescribed by ADONAI are as many yods as there are on the boundaries of the first (6+6) regular polygons enfolded in each of the 10 trees.

Figure 5

With their $(35+35)$ sectors constructed from tetractyses, there are $(192+192)$ yods in the first $(6+6)$ enfolded polygons that are intrinsic to them, i.e., unshared with polygons enfolded in adjacent trees. Of, these, $(24+24)$ are intrinsic corners (white circles) of polygons, leaving $(168+168)$ red and blue yods other than corners. The $(60+60)$ polygons of the first six types enfolded in 10 overlapping Trees of Life have $(240+240)$ corners and $(1680+1680)$ yods other than corners. The superstring structural parameter 1680 is embodied not only by the boundaries of the polygons but also by their yod populations. The 3360 yods other than corners symbolise the 3360 turns in one revolution of the ten helical whorls of the $E_8 \times E_8'$ heterotic superstring.

A circularly polarised wave comprises two plane waves oscillating 90° out of phase with each other. The $(240+240)$ corners denote the $(240+240)$ plane waves associated with the 240 gauge charges of E_8 , which are spread over the 10 whorls of the $E_8 \times E_8'$ heterotic superstring, 24 to a whorl.



240 ○

840 ●

840 ●

The (1680+1680) yods other than the (240+240) corners in the (60+60) polygons of the first 6 types enfolded in 10 Trees of Life symbolise the 1680 turns in an outer & an inner half-revolution of the 10 whorls of the UPA/superstring.

240 ○

840 ●

840 ●

Figure 6

DNA is made of chemical building blocks called nucleotides. These building blocks are made of three parts: a phosphate group, a sugar group (2-deoxyribose, which is a pentose (five carbon) sugar) and one of four types of nitrogen bases. To form a strand of DNA, nucleotides are linked into chains, with the phosphate and sugar groups alternating along the sides of the 'ladder' of DNA's double helix. The four types of nitrogen bases found in nucleotides are: adenine (A), thymine (T), guanine (G) and cytosine (C). The two strands of the molecule are held together by hydrogen bonding between pairs of complementary nitrogen bases, base A always with base T and base C always with base G.

RNA is a single strand molecule with a much shorter chain of nucleotides than DNA. Whereas DNA contains deoxyribose, RNA contains ribose, whose OH group makes it less stable than DNA. The complementary base to adenine is not thymine but uracil (U). Messenger RNA carries information about a protein sequence to the ribosomes, which synthesize protein in the cell. Transfer RNA is a small RNA chain of about 80 nucleotides that transfer a specific amino acid to a growing polypeptide chain at the ribosomal site of protein synthesis. Groups of three bases (codons) in mRNA hydrogen bond to their complementary anticodons in tRNA. This reads the sequence of the messenger RNA and is attached to the amino acids. Each type of tRNA can be attached to only one type of amino acid. Each codon encodes for a specific amino acid, although a given amino acid may be encoded by several codons. The table lists the 64 base triplets in DNA, the 64 mRNA codons and their complementary tRNA anticodons, together with the amino acid for which they code.

Codons & anticodons for the amino acids

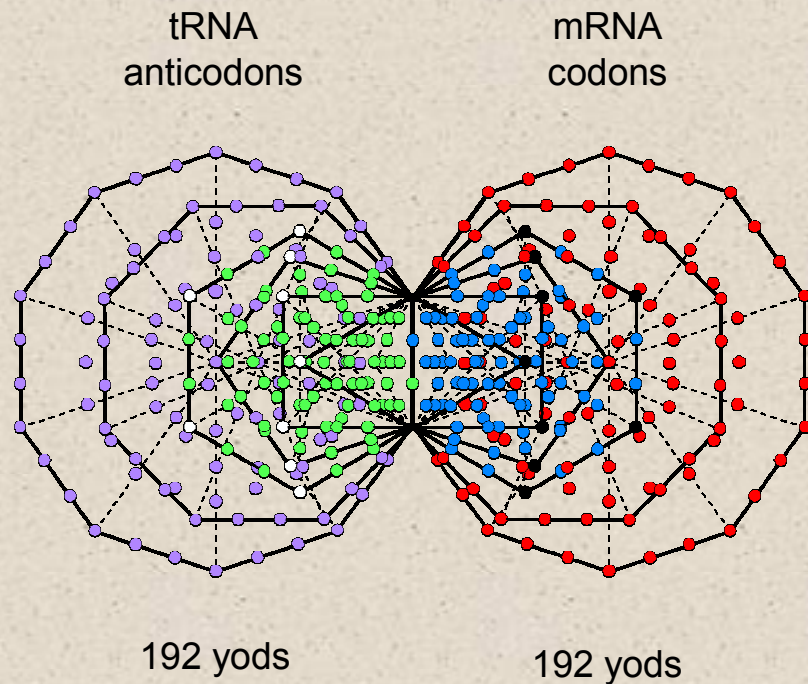
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Amino Acid	DNA Base Triplets	mRNA Base Codons	tRNA Base Anticodons
alanine	CGA, CGG, CGT, CGC	GCU, GCC, GCA, GCG	CGA, CGG, CGU, CGC
arginine	GCA, GCG, GCT, GCC, TCT, TCC	CGU, CGC, CGA, CGG, AGA, AGG	GCA, GCG, GCU, GCC, UCU, UCC
asparagine	TTA, TTG	AAU, AAC	UUA, UUG
aspartate	CTA, CTG	GAU, GAC	CUA, CUG
cysteine	ACA, ACG	UGA, UGC	ACA, ACG
glutamate	CTT, CTC	GAA, GAG	CUU, CUC
glutamine	GTT, GTC	CAA, CAG	GUU, GUC
glycine	CCA, CCG, CCT, CCC	GGU, GGC, GGA, GGG	CCA, CCG, CCU, CCC
histidine	GTA, GTG	CAU, CAC	GUA, GUG
isoleucine	TAA, TAG, TAT	AUU, AUC, AUA	UAA, UAG, UAU
leucine	AAT, AAC, GAA, GAG, GAT, GAC	UUA, UUG, CUU, CUC, CUA, CUG	AAU, AAC, GAA, GAG, GAU, GAC
lysine	TTT, TTC	AAA, AAG	UUU, UUC
methionine	TAC	AUG	UAC
phenylalanine	AAA, AAG	UUU, UUC	AAA, AAG
proline	GGA, GGG, GGT, GGC	CCU, CCC, CCA, CCG	GGA, GGG, GGU, GGC
serine	AGA, AGG, AGT, AGC, TCA, TCG	UCU, UCC, UCA, UCG, AGU, AGC	AGA, AGG, AGU, AGC, UCA, UCG
stop	ATG, ATT, ACT	UAA, UAG, UGA	AUU, AUC, ACU
threonine	TGA, TGG, TGT, TGC	ACU, ACC, ACA, ACG	UGA, UGG, UGU, UGC
tryptophan	ACC	UGG	ACC
tyrosine	ATA, ATG	UAU, UAC	AUA, AUG
valine	CAA, CAG, CAT, CAC	GUU, GUC, GUA, GUG	CAA, CAG, CAU, CAC

Figure 7

The 384 instances of the nitrogen bases in the 64 codons of mRNA and the 64 anticodons of tRNA are symbolised by the 384 yods in the (6+6) enfolded polygons other than the endpoints of their shared root edge. The Godname ELOHIM with number value 50 and the Godname YAHWEH with number value 26 prescribe the 384 instances because the (6+6) enfolded polygons have 50 corners, each set of six polygons having 26 corners.

There are $(27 \times 3 = 81)$ instances of A, C & G bases in the $(3^3 = 27)$ bases that contain only them. There are $(37 \times 3 = 111)$ instances for the 37 codons that contain at least one U base. These codons include the three stop codons UAA, UAG & UGA. There are $(34 \times 3 = 102)$ instances of bases in codons that include the U base and which encode solely for amino acids. Hence, the 192 instances of bases consist of 81 instances of A, C & G bases in the 27 codons containing only them, nine instances of bases in the three stop codons and 102 instances of bases in the 34 other codons. This 81:9:102 division compares with the pattern of yods associated with each set of six polygons. The 90 yods associated with the first four polygons symbolise the 90 instances of either A, C & G bases in the 27 codons or the bases in the stop codons. The 102 yods of the octagon and decagon symbolise the 102 instances of bases in the 34 codons containing a U base. Similarly for the anticodons. A yod and its mirror image in the other set of polygons denotes an instance of a base and an instance of its complement. The two sets of polygons are the sacred geometrical basis of human mRNA and tRNA.



- $9 = 3 \times 3$ → 9 instances of bases in 3 stop mRNA codons
- $81 = 3 \times 27$ → 81 instances of bases in 27 mRNA codons containing only G, C & A
- $102 = 3 \times 34$ → 102 instances of bases in 34 non-stop mRNA codons containing U
- $9 = 3 \times 3$ → 9 instances of bases in 3 stop tRNA anticodons
- $81 = 3 \times 27$ → 81 instances of bases in 27 tRNA anticodons containing only C, G & U
- $102 = 3 \times 34$ → 102 instances of bases in 34 non-stop tRNA anticodons containing A

The 384 yods in the first (6+6) enfolded polygons other than the endpoints of the root edge symbolize the 384 times the four bases appear in the 64 mRNA codons and in the 64 tRNA anticodons

Figure 8

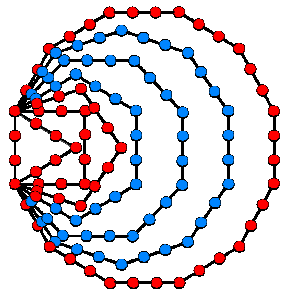
The 60 mRNA codons and their 60 anticodons have their counterparts in:

1. the inner Tree of Life as the 60 red yods lining the boundaries of the enfolded triangle, square, pentagon & dodecagon and as the 60 blue yods lining the boundaries of the hexagon, octagon & decagon;
2. the pair of dodecagons as the 60 hexagonal yods in either one;
3. the disdyakis triacontahedron as the 60 faces in each half of the polyhedron.

When its 12 sectors are each constructed from three tetractyses, the dodecagon has 180 yods surrounding its centre. They represent the 180 instances of the four nitrogen bases C, G, U & A. The three groups of four sectors arranged in a cross each contain 60 yods. A yod from each group denotes an instance of a base in the 60 non-stop/start codons.

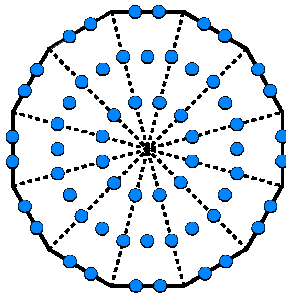
The 60 non-stop/start codons & their anticodons embodied in sacred geometries

Inner Tree of Life

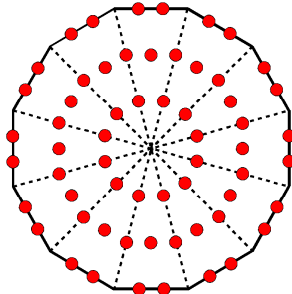


60 ● → 60 mRNA codons
60 ● → 60 tRNA anticodons

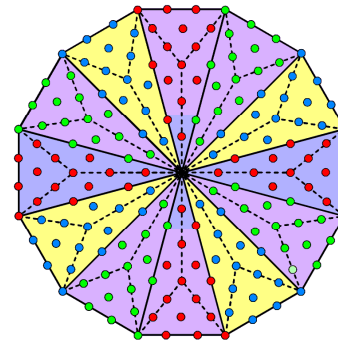
Dodecagon



60 ●



60 ●

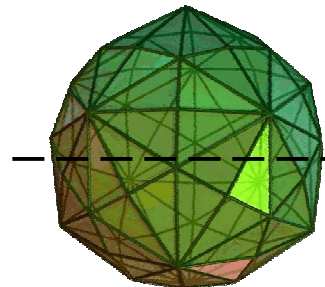


60 ● 60 ● 60 ●



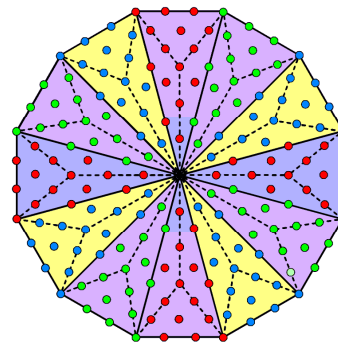
60 mRNA codons other than start or stop codons

Disdyakis triacontahedron



60 faces

60 faces



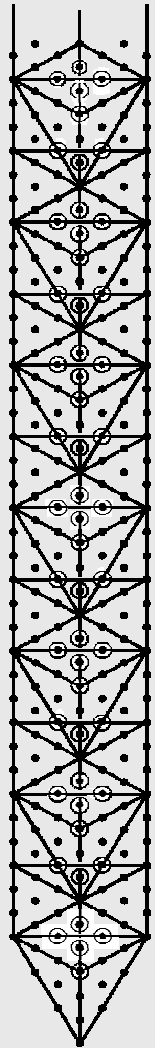
60 ● 60 ● 60 ●



60 tRNA anticodons

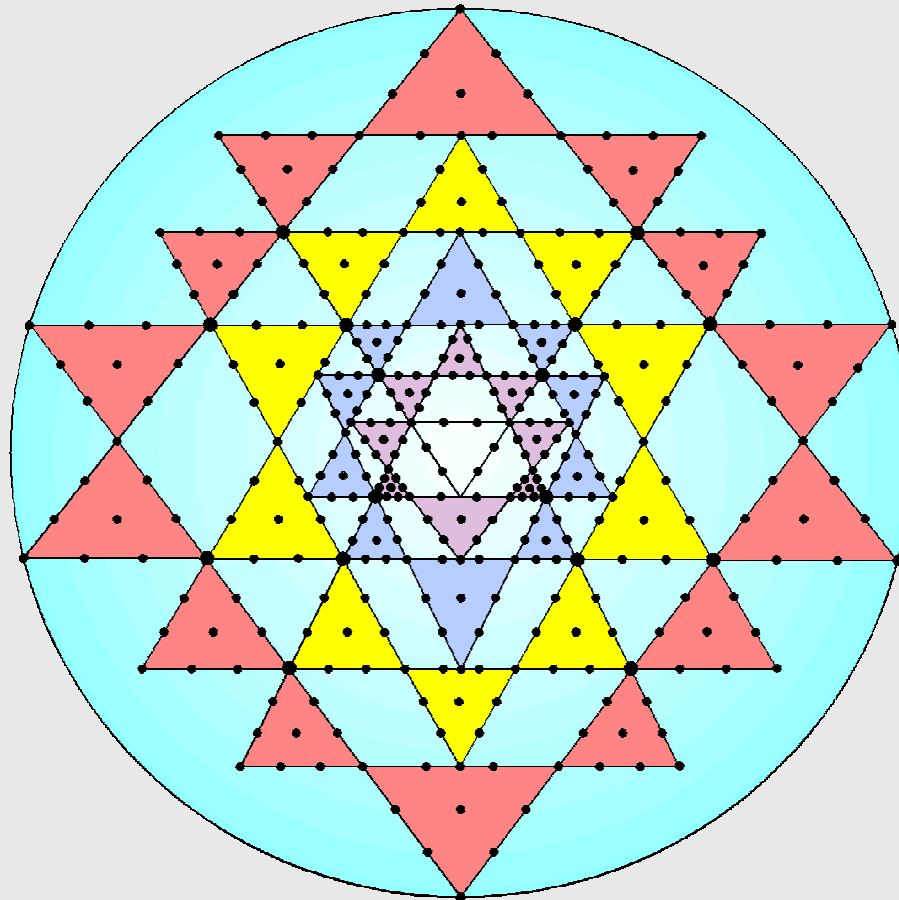
Figure 9

There are 384 yods up to the top of the seventh, overlapping Tree of Life. The 42 triangles of the Sri Yantra have 378 yods, whilst the central triangle has six hexagonal yods on its edges, a total of 384 yods. Both sacred geometries express the seven-fold nature of holistic systems, the seven trees representing the seven Sephiroth of Construction. Their equivalence is further demonstrated by the fact that there are 259 corners, edges & triangles up to the top of the seventh tree, whilst the 43 triangles in the Sri Yantra are composed of 259 corners, edges & triangles.



= 384 =

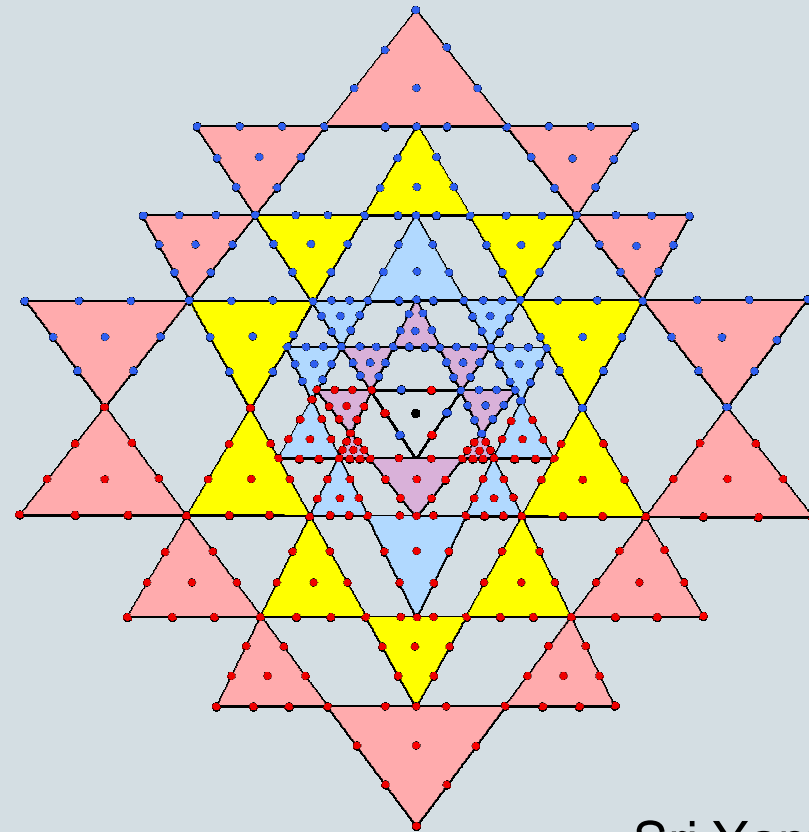
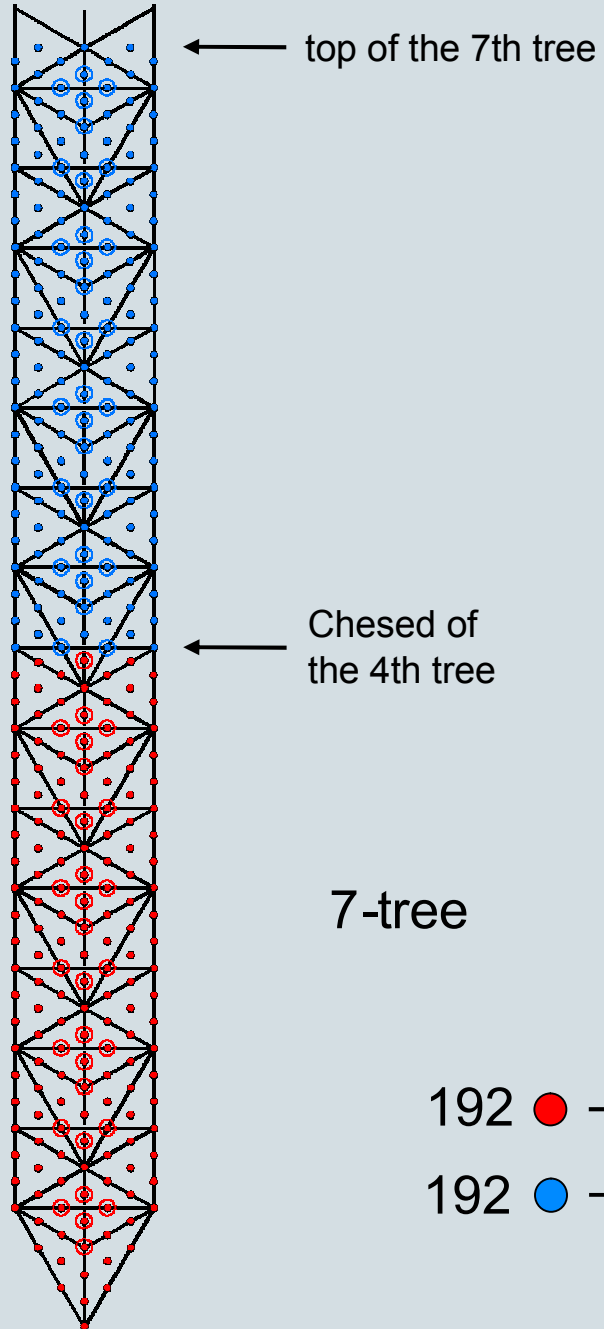
⊙ = 2



The Sri Yantra is equivalent to the lowest 7 Trees of Life because it has as many yods as there are yods up to their apex

Figure 10

When its triangles are turned into tetractyses, there are 384 yods up to the top of the seventh Tree of Life. They correspond to the 384 yods in the 3-dimensional Sri Yantra whose 43 triangles are turned into tetractyses. They also denote the 384 instances of the four nitrogen bases in the 64 codons of messenger RNA and in the 64 anticodons of transfer RNA. This is the Kabbalistic and Sri Yantra basis for the DNA molecule. There are 192 blue yods from the top of the seventh tree down to the Path joining Chesed and Geburah of the fourth tree and 192 red yods below it. They denote the 192 instances of the bases in tRNA and mRNA.



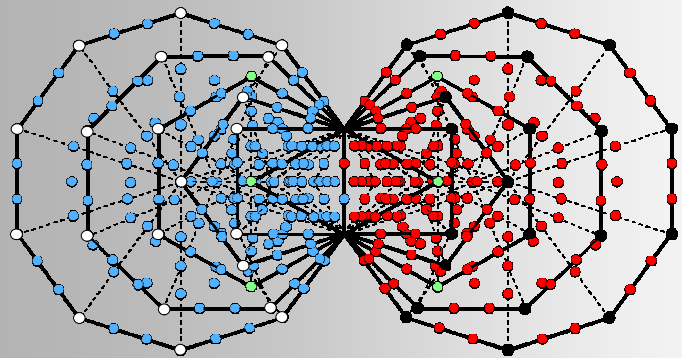
Sri Yantra

192 ● → 192 instances of bases in mRNA codons

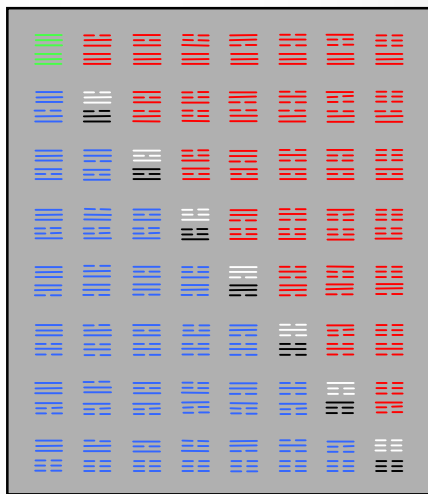
192 ● → 192 instances of bases in tRNA anticodons

Figure 11

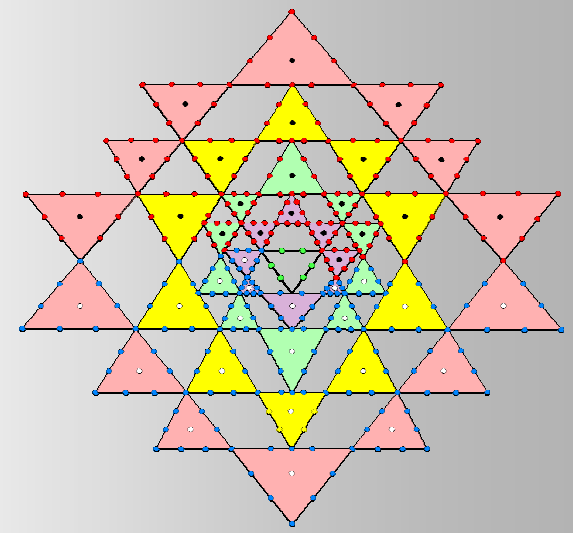
Constructed from tetractyses, the first (6+6) enfolded polygons of the inner Tree of Life have 384 yods other than the endpoint of their shared root edge. They are the counterpart of the 384 yin/yang lines in the table of 64 hexagrams used in I Ching, the ancient Chinese system of divination. They are also the counterpart of the 384 yods in the 43 triangles of the 3-dimensional Sri Yantra. The six green yods at the centre, top & lowest corners of the two hexagons that coincide with the positions of Sephiroth correspond to the six yang lines in the two 'Heaven' trigrams of the hexagram in the top left-hand corner of the table and to the six hexagonal yods in the central triangle that are arranged at the corners of a hexagon. The two sets of 21 corners of the (6+6) polygons are the counterpart of the two sets of 21 yin/yang lines in the seven other hexagrams forming the diagonal of the table and to the centres of the 21 tetractyses in each half of the Sri Yantra. The (168+168) yods other than corners of polygons are the counterpart of the (168+168) yin/yang lines in the (28+28) off-diagonal hexagrams and to the (168+168) yods on the edges of the (21+21) tetractyses.



≡



≡



6 ●
 168 ○ 21 ● 168 ●
 21 ○

6 —
 168 —& - - 21 —& - - 168 —& - -
 21 —& - -

6 ●
 168 ○ 21 ● 168 ●
 21 ○

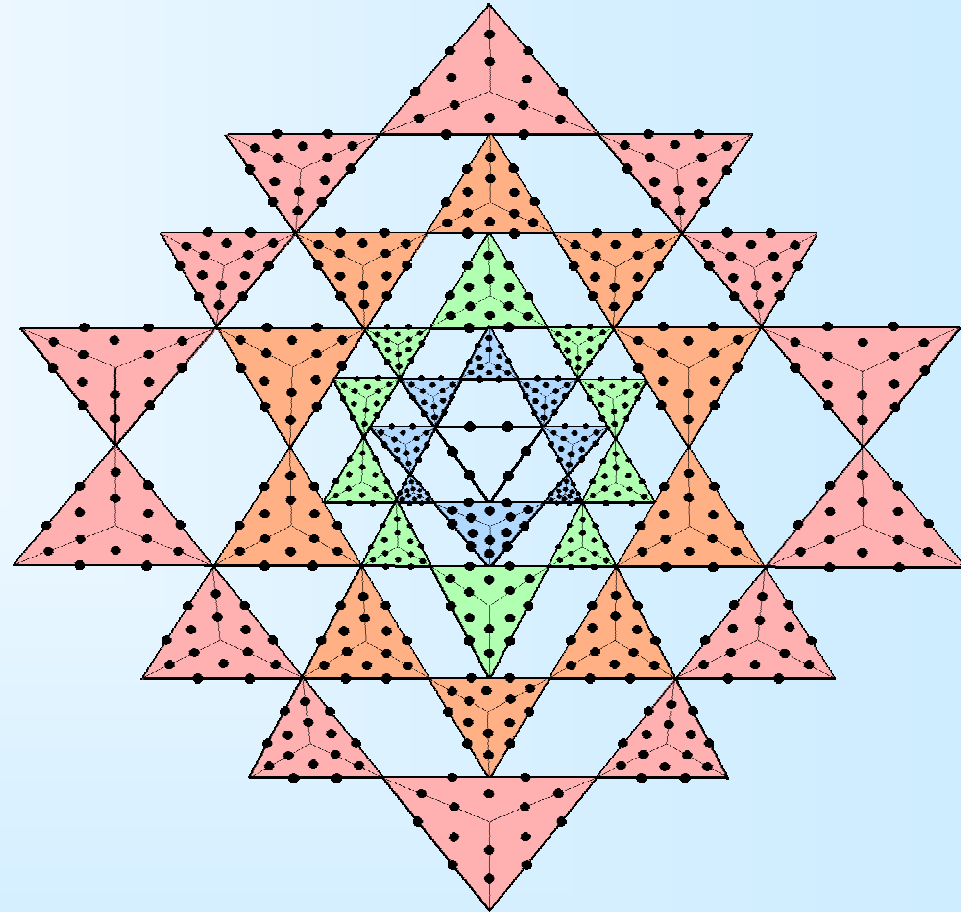
Total number of degrees of freedom = 384

The correspondence between the inner Tree of Life, the I Ching table & the Sri Yantra

Figure 12

When each of the 42 triangles in the Sri Yantra is divided into its three sectors and each sector then turned into a tetractys, 636 hexagonal yods are generated. This is the sum of the number values of the Godnames of the ten Sephiroth.

$$636 = \begin{array}{r} 21 \\ 26 \ 50 \\ 31 \ 36 \ 76 \\ 129 \ 153 \ 49 \ 65 \end{array} =$$

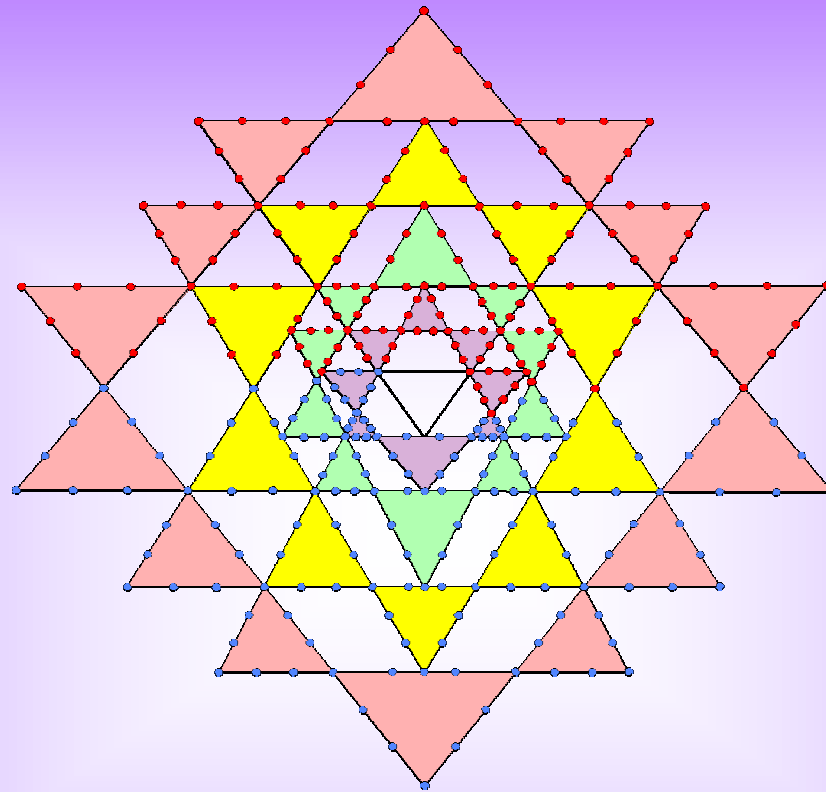


**The sum of the 10 Godname numbers is the number
of hexagonal yods in the 2-d Sri Yantra**

Figure 13

Assigning the number 10 (the Pythagorean Decad) to the 336 yods on the 126 edges of the 42 triangles of the 3-dimensional Sri Yantra generates the number 3360 — the number of turns in one revolution of the ten whorls of the $E_8 \times E_8$ ' heterotic superstring. This demonstrates how the Sri Yantra and the inner Tree of Life are equivalent representations of holistic systems like the heterotic superstring. Each half of the Sri Yantra with 168 yods defines the number (1680) of circularly polarized oscillations made by all ten closed curves of the superstring during half of a revolution around its spin axis. The inner and outer halves of the superstring correspond to the two halves of the Sri Yantra. They are prescribed by the Godname EHYEH with number value 21 because 21 triangles in each half surround its central triangle.

3360 =



● = ● = 10

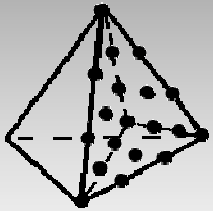
3360 is the sum of the number 10 (Decad) assigned to each of the 336 yods on the 126 edges of the 42 triangles of the 3-d Sri Yantra

Figure 14

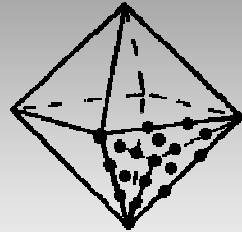
Consider the faces of the Platonic solids divided into their sectors. Each polyhedral edge is the side of an internal triangle with a corner at the centre of the solid. When the sectors in the faces and their internal triangles are turned into tetractyses, the average number of yods in the first four Platonic solids is 168. This is how these regular polyhedra, which the ancient Greeks believed were the shapes of the particles of the elements Earth, Water, Air & Fire, determine the structural parameter 168 of the superstrings making up atoms.

The average number of yods in their faces is 137. This is the integer that approximately determines the magnitude of the fine-structure constant, which in turn determines some of the properties of atoms.

The first four Platonic solids have 38 faces. Their 120 sectors have 248 vertices & edges. They embody the dimension 248 of the superstring gauge symmetry group E_8 .

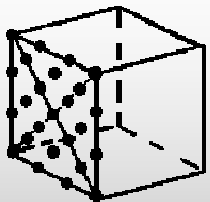


tetrahedron

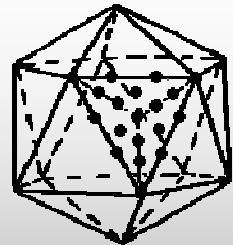


octahedron

The faces of the tetrahedron, octahedron, cube & icosahedron have 120 sectors with 248 corners & sides.



cube



icosahedron

The average number of yods in faces of the first four Platonic solids is 137.

The average number of yods (including centres) in the faces and interiors of the first four Platonic solids is 168.