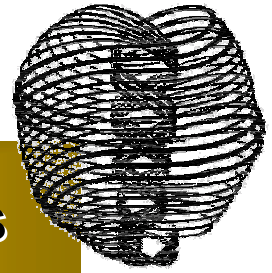# The Music of Superstrings

by

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**Abstract**

Not only are there seven notes of the diatonic musical scale but also seven types of 36 groups of notes can be played using a tetractys array of ten notes. These groups constitute a Tree of Life pattern because they correspond to the 36 corners of the seven enfolded polygons in each half of the inner form of the Tree of Life. The same is true for the 524 ways in which the ten notes can be played to create 5–10 sounds, for they correspond to the 524 yods of the whole inner tree. These sequences include 240 sequences of 10 notes and 240 sequences of eight, nine and 10 sounds. Tetractys arrays of the ten octaves of each note of the diatonic scale generate 1680 sequences of ten notes, that is, 16,800 notes. This musical pattern is similar to the 16800 spirillae in the ten whorls of the heterotic superstring described over a century ago by Annie Besant and C.W. Leadbeater. It suggests that the heterotic superstring of ordinary matter is like a ten-stringed harp whose 240 musical sequences (actually ten sets of 24) correspond to 240 gauge charges of the superstring symmetry group $E_8$ spread out over its length, each set of 24 sequences being analogous to the 24 charges carried by each whorl/string component of the superstring. The analogy predicts that the heterotic superstring of shadow matter consists of five whorls with 12600 spirillae. The superstring is like a self-playing, musical instrument whose states are its score and whose unified force described by $E_8$ is the music that it makes.

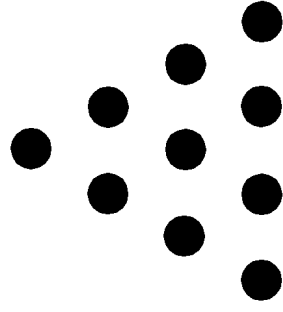# THE 36 CORNERS OF THE 7 ENFOLDED POLYGONS DENOTE THE 36 MUSICAL ELEMENTS THAT A TETRACTYS OF 10 NOTES CAN PLAY
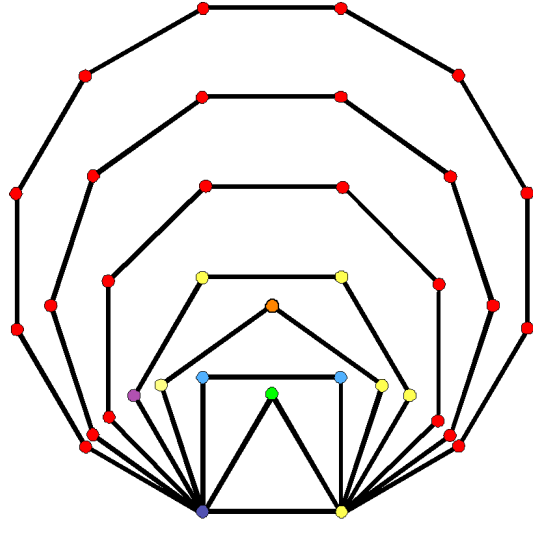
$$_1P^1 = 1! = 1$$

$$_2C^2 + {}_2P^2 = 1 + 2! = 3$$

$$_3C^3 + {}_3P^3 = 1 + 3! = 7$$

$$_4C^4 + {}_4P^4 = 1 + 4! = 25$$

$$\text{TOTAL} = \underline{36}$$

$_2C^2$ = 1 harmonic interval = 1(●)

$_3C^3$ = 1 chord of 3 notes = 1(●)

$_4C^4$ = 1 chord of 4 notes = 1(●)

1! = 1 note = 1(●)

2! = 2 melodic intervals = 2(●)

3! = 6 broken chords = 6(●)

4! = 24 broken chords = 24(●)

Figure 1

# 1. Musical Potential of Tetractys of Notes

Consider a tetractys array of 10 notes of the diatonic scale labelled by letters of the alphabet:

```
1                      A
2                    B   C
3                  D   E   F
4                G   H   I   J
```

What these notes are need not be known at this point; they will be specified later. A combination of notes played together defines a harmonic interval or a chord and their various permutations played in succession define melodic intervals and broken chords. The rule for playing a tetractys of notes is: starting with note A, the 10 notes are played in four stages, each one using *all* the notes in a row and not notes in other rows. There are seven types of basic musical elements, or 'sounds': the starting note A (written '**1**'), a harmonic interval formed from B & C (written '**2**'), a melodic interval formed from notes B & C (written '**2**'), a chord (written '**3**') and a broken chord (**3**) formed from D, E & F and a chord (**4**) and broken chord (**4**) formed from G, H, I & J. The numbers of sounds playable at each stage are listed below:

| | | |
|---|---|---|
| 1 | $^{1}C_{1} = 1$ | (**1**) |
| 2 | $^{2}C_{2} + {}^{2}P_{2} = 1 + 2 = 3$ | (**2** & 2×**2**) |
| 3 | $^{3}C_{3} + {}^{3}P_{3} = 1 + 6 = 7$ | (**3** & 6×**3**) |
| 4 | $^{4}C_{4} + {}^{4}P_{4} = 1 + 24 = 25$ | (**4** & 24×**4**) |
| | **TOTAL = 36** | |

ELOHA, the Godname of Geburah with number value **36,** prescribes how many basic harmonies and melodies can be played by using the notes in each row of the tetractys. **36** is also the number of corners in the seven enfolded polygons forming each half of the inner form of the Tree of Life. Figure 1 shows how the numbers of the seven types of sounds correspond to the corners of these polygons. The number of ways ('musical sequences') the 10 notes can be played = 1×3×7×25 = 525. Of these, the musical sequence **1·2·3·4** consists of four sounds, the least number of sounds that the tetractys can play. The 524 musical sequences comprising 5-10 sounds are listed below:

| Musical sequence | Number of Sounds | Number of musical sequences | Number of sounds |
|---|---|---|---|
| 1.    **1·2·3·4** | 1 + 2 + 3 + 4 = 10 | 1×2!×3!×4! = 288 | 288×10 = 2880 |

236 (●)

288 (●)

Figure 2

4
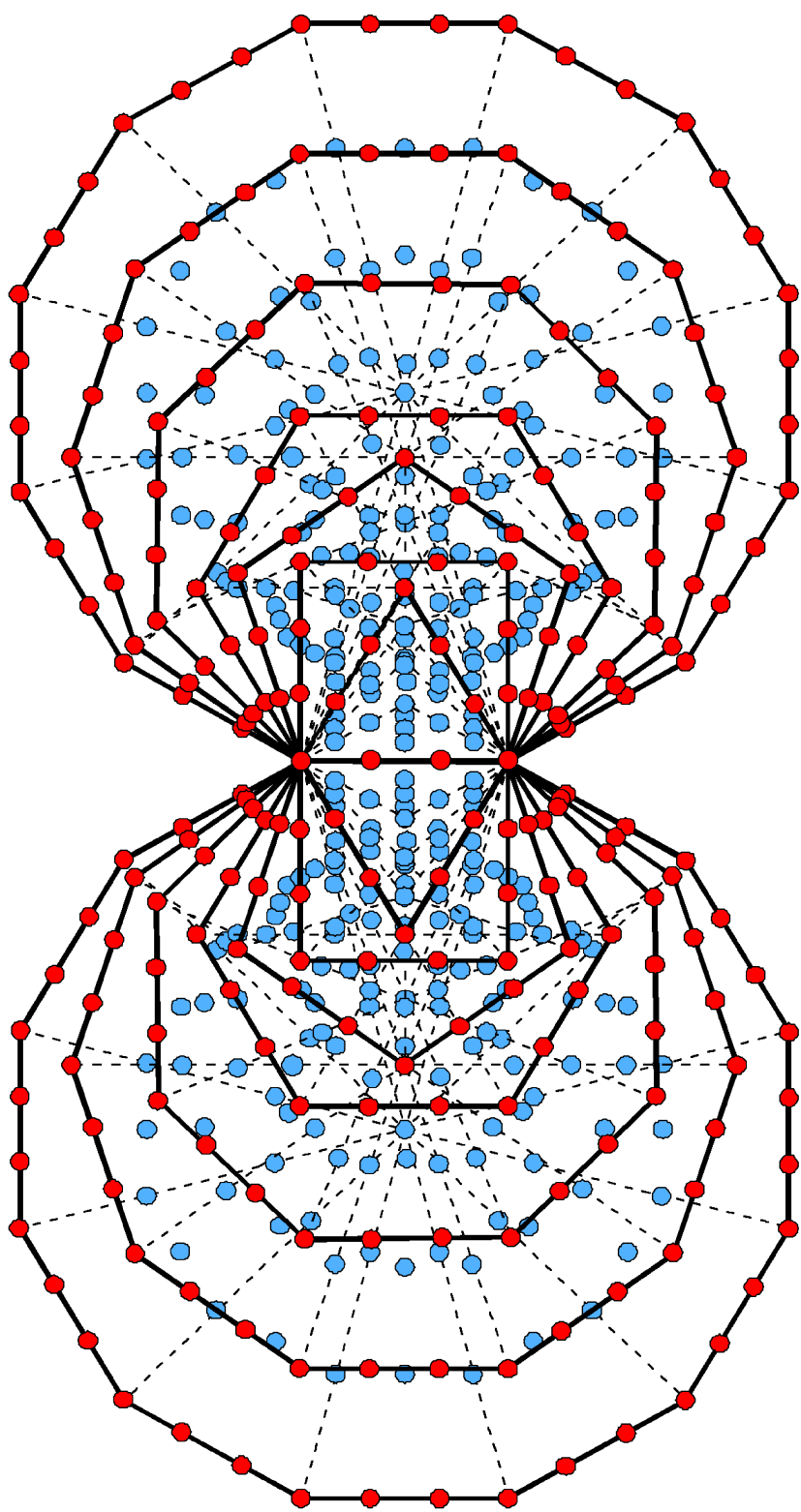
| | | | | |
|---|---|---|---|---|
| 2. | **1·2·3·4** | 1 + 1 + 3 + 4 = 9 | 1×1×3!×4! = 144 | 144×9 = 1296 |
| 3. | **1·2·3·4** | 1 +2 + 1 + 4 = 8 | 1×2!×1×4! = **48** | 48×8 = 384 |
| | | | **SUBTOTAL** = 480 | **SUBTOTAL** = 4560 |
| 4. | **1·2·3·4** | 1 + 1 + 1 + 4 = 7 | 1×1×1×4! = 24 | 24×7 = 168 |
| 5. | **1·2·3·4** | 1 + 2 + 3 + 1 = 7 | 1×2!×3!×1 = 12 | 12×7 = 84 |
| 6. | **1·2·3·4** | 1 + 1 + 3 + 1 = 6 | 1×1×3!×1 = 6 | 6×6 = 36 |
| 7. | **1·2·3·4** | 1 + 2 + 1 + 1 = 5 | 1×2!×1×1 = 2 | 2×5 = 10 |
| | | | **SUBTOTAL** = 44 | **SUBTOTAL** = 298 |
| | | | **TOTAL** = 524 | **TOTAL** = 4858 |

As in the case of the sounds playable with a tetractys, the 524 musical sequences are of seven types. (24 + 12 = **36**) sequences of two types contain the *same* number (7) of sounds and (524 - **36** = 488) sequences of five types contain different numbers of sounds. The latter comprise two sequences (**1·2·3·4**) of five sounds, six sequences
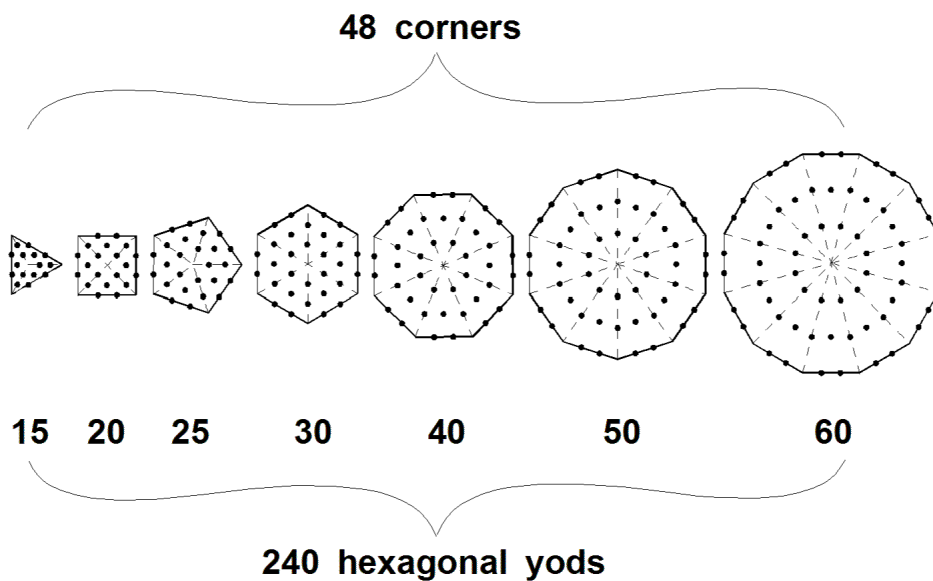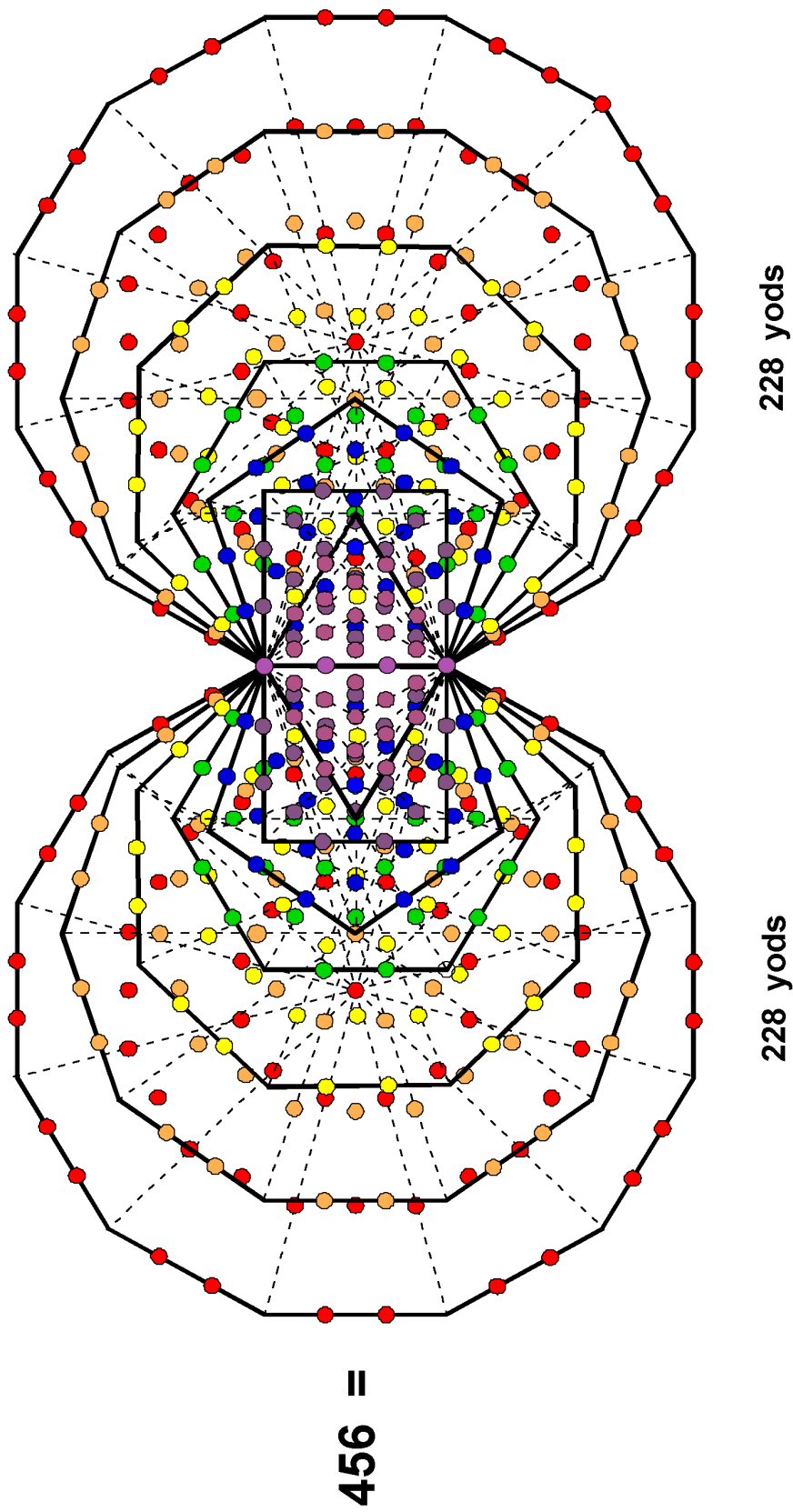
**48 corners**



15   20   25   30   40   50   60

Figure 3

**240 hexagonal yods**

(**1·2·3·4**) of six sounds and 480 sequences of eight, nine & 10 sounds that terminate in broken chords of four notes. Of the latter, 288 (=1!×2!×3!×4!) are sequences of 10 successive notes (note, melodic interval & two broken chords). The division:

$$524 = 288 + 236$$

between the number of sequences of 10 notes and the number of sequences of 5-9 sounds has its counterpart in the (7+7) enfolded polygons, which have 236 yods on their boundaries and 288 yods inside them (Fig. 2). Furthermore, 288 yods surround the centres of the seven *separate* polygons, of which **48** are corners and 240

5

456 =

228 yods

228 yods

The (7+7) enfolded polygons have 456 yods
that are not corners outside their shared base

Figure 4

6

**480 =**
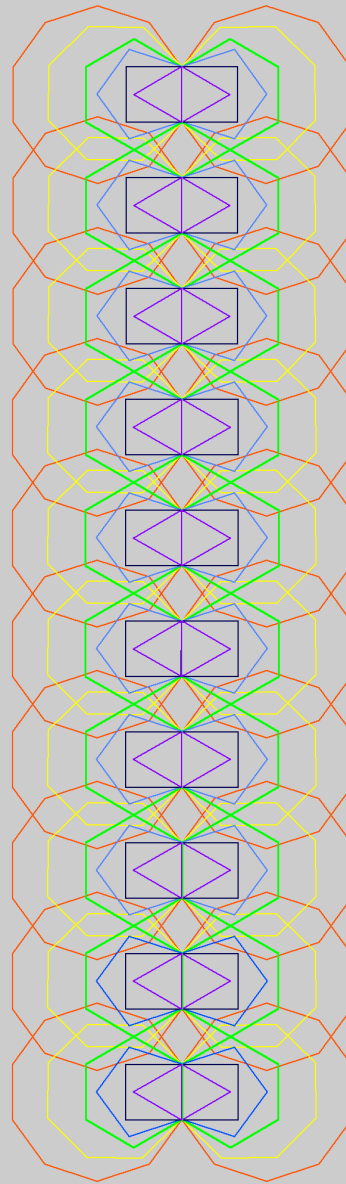
240     240

**Each set of the first 6 polygons enfolded in 10 Trees of Life has 240 associated corners**

Figure 5 480 corners are intrinsic to the (6+6) polygons enfolded in 10 Trees of Life.

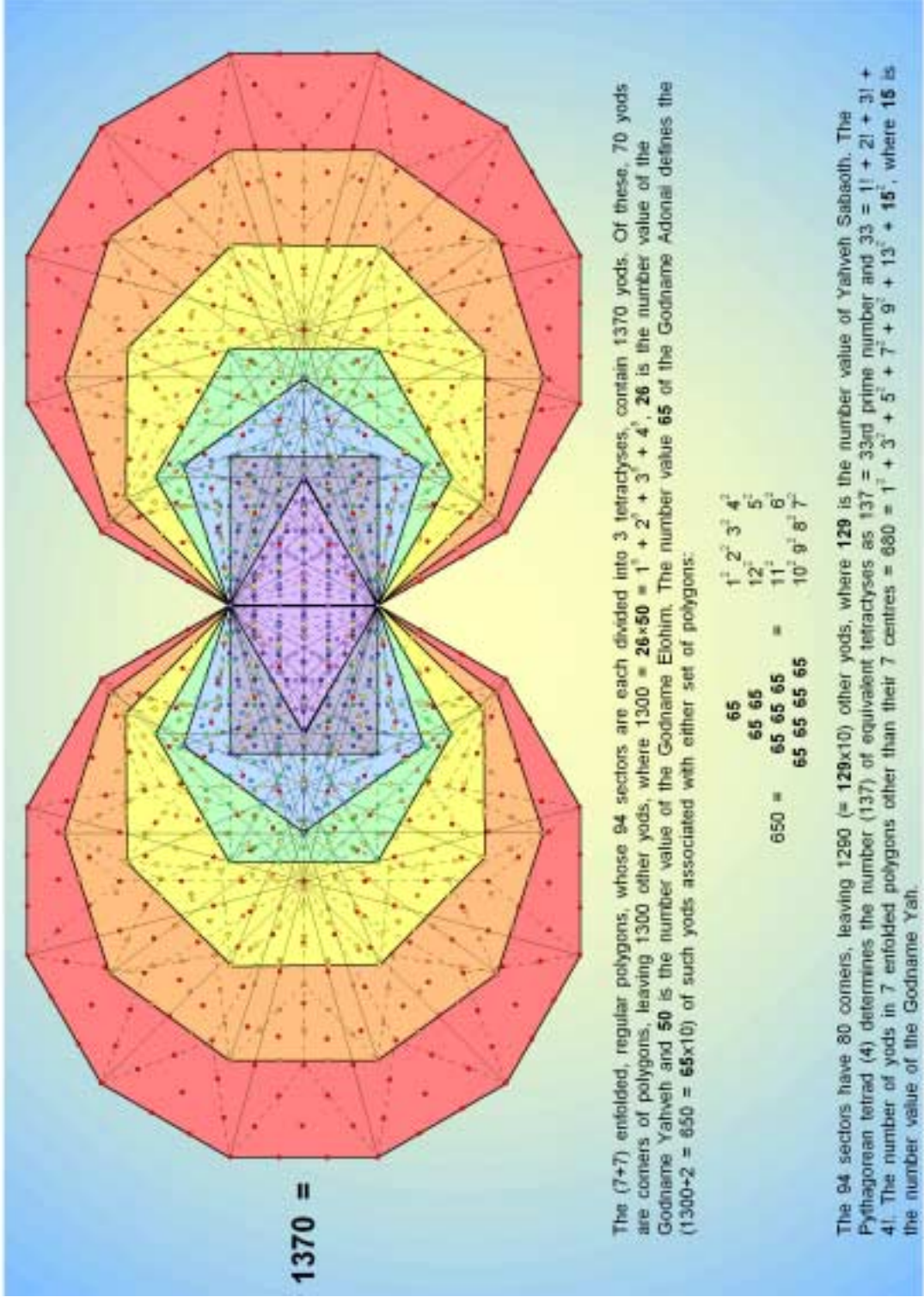The (7+7) enfolded, regular polygons, whose 94 sectors are each divided into 3 tetractyses, contain 1370 yods. Of these, 70 yods are corners of polygons, leaving 1300 other yods, where $1300 = 26 \times 50 = 1^3 + 2^3 + 3^3 + 4^3$. **26** is the number value of the Godname Yahveh and **50** is the number value of the Godname Elohim. The number value **65** of the Godname Adonai defines the $(1300 \div 2 = 650 = 65 \times 10)$ of such yods associated with either set of polygons:

$$650 = \begin{matrix} 65 \\ 65 \; 65 \\ 65 \; 65 \; 65 \\ 65 \; 65 \; 65 \; 65 \end{matrix} = \begin{matrix} 1^2 \; 2^2 \; 3^2 \; 4^2 \\ 12^2 \quad 5^2 \\ 11^2 \quad 6^2 \\ 10^2 \; 9^2 \; 8^2 \; 7^2 \end{matrix}$$

The 94 sectors have 80 corners, leaving 1290 (= 129×10) other yods, where **129** is the number value of Yahveh Sabaoth. The Pythagorean tetrad (4) determines the number (137) of equivalent tetractyses as 137 = 33nd prime number and $33 = 1! + 2! + 3! + 4!$, where **15** is the number of yods in 7 enfolded polygons other than their 7 centres $= 680 = 1^2 + 3^2 + 5^2 + 7^2 + 9^2 + 13^2 + 15^2$, where **15** is the number value of the Godname Yah.

Figure 6 (The (7+7) enfolded, type B polygons have 1370 yods.

are hexagonal yods (Fig. 3). This division:

$$288 = \mathbf{48} + 240$$

$$= 2 \times 4! + 10 \times 4! = 12 \times 4!$$

characterises a Tree of Life pattern whose counterpart for the tetractys of notes are the 12×4! sequences (**1**·**2**·**3**·**4**) of 10 notes, two of which contain five notes in the rows of two and three played in either ascending or descending pitch and 10 of which contain such notes with both ascending and descending pitch. This means that the 480 sequences split into 10 sets of 24 sequences of 10 notes, totalling 2400 notes, and **48,** 144 and **48** sequences of, respectively, eight, nine and 10 sounds, making a total of 2160 sounds in 240 more sequences. (2400 + 2160 = 4560) sounds are played in the 480 sequences.

The number of yods in n overlapping Trees of Life is:

$$\tilde{Y}(n) = \mathbf{50}n + 20.$$

The 91 trees of CTOL have $\tilde{Y}(91) = (\mathbf{50} \times 91 + 20 = 4570)$ yods. There are 10 yods in CTOL arranged in a te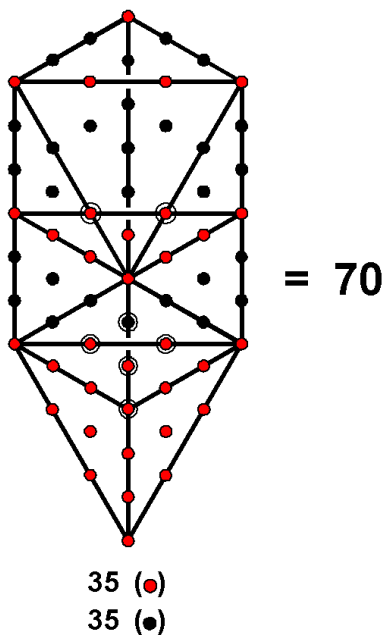tractys down to the path connecting Chokmah and Binah of the 91st tree. Below the highest Binah in CTOL are therefore 4560 yods, that is, the number of yods in 456 tetractyses. Supposing that these 10 highest yods in CTOL symbolised 10 notes of the diatonic scale, then each yod below the Supernal Triad of the highest tree would symbolise a sound made during the playing of the 480 sequences! This amazing property is indicative of the archetypal character of these sequences, which are the counterpart of the (240 + 240 = 480) hexagonal yods of the (7+7) separate polygons (Fig. 3).



= 70

35 (⊙)
35 (●)

Figure 7 The 70 yods of
the Tree of Life.

Further evidence of these 480 sequences constituting a Tree of Life pattern is as follows: the (7+7) enfolded polygons have 70 corners, that is, 68 corners outside their root edge. The number of yods that are not external corners = 524 - 68 = 456 (Fig. 4). The (70+70) polygons enfolded in 10 overlapping Trees of Life therefore have 4560 such yods. Each set of 70 polygons has **351** corners, **331** of them outside their root edges. **351** is the number value of *Ashim*, the Order of Angels assigned to Malkuth, and **331** is the number value of *Ratziel*, the

Archangel of Chokmah. These as well as other Godnames, Archangelic names, etc characterise the inner form of 10 overlapping Trees of Life containing 4560 yods other than corners outside their shared edges. The division

$$480 = 240 + 240$$

is present in the inner form of 10 overlapping Trees of Life as the (240+240) corners of
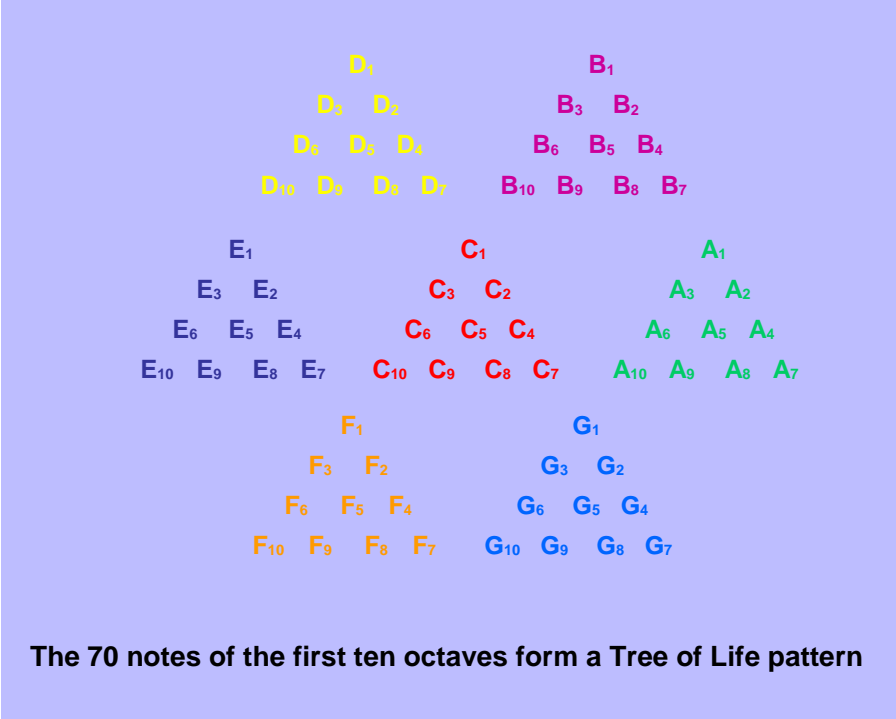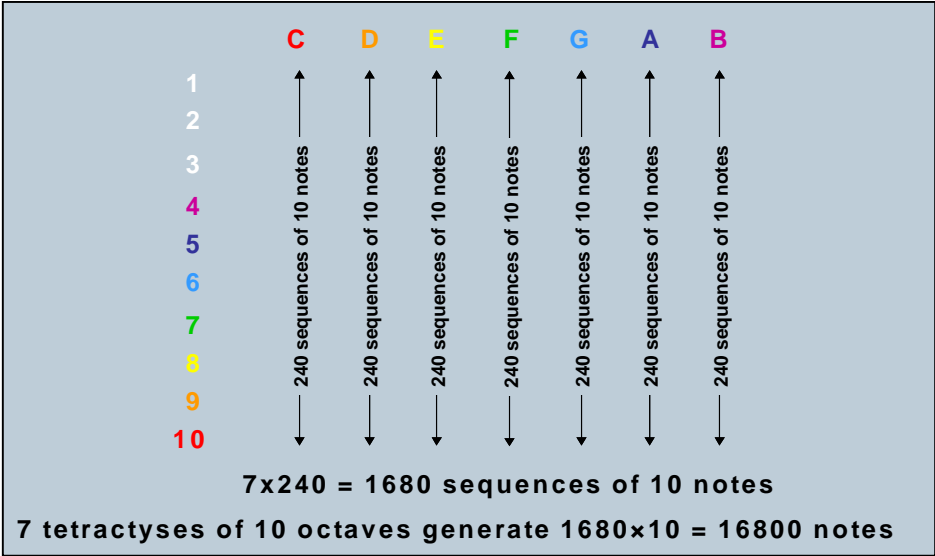
Figure 8

**The 70 notes of the first ten octaves form a Tree of Life pattern**

Figure 9

**7 × 240 = 1680 sequences of 10 notes**

**7 tetractyses of 10 octaves generate 1680 × 10 = 16800 notes**

the first (6+6) polygons enfolded in them (Fig. 5).

We have seen that playing a tetractys of 10 notes to create 8, 9 and 10 sounds

**TABLE 1 Table of tone ratios**

|    | C   | D   | E     | F      | G   | A     | B       |
|----|-----|-----|-------|--------|-----|-------|---------|
| 1  | 1   | 9/8 | 81/64 | 4/3    | 3/2 | 27/16 | 243/128 |
| 2  | 2   | 9/4 | 81/31 | 8/3    | 3   | 27/8  | 243/64  |
| 3  | 4   | 9/2 | 81/16 | 16/3   | 6   | 27/4  | 243/32  |
| 4  | 8   | 9   | 81/8  | 32/3   | 12  | 27/2  | 243/16  |
| 5  | 16  | 18  | 81/4  | 64/3   | 24  | 27    | 243/8   |
| 6  | 32  | 36  | 81/2  | 128/3  | 48  | 54    | 243/4   |
| 7  | 64  | 72  | 81    | 256/3  | 96  | 108   | 243/2   |
| 8  | 128 | 144 | 162   | 512/3  | 192 | 216   | 243     |
| 9  | 256 | 288 | 324   | 1024/3 | 384 | 432   | 486     |
| 10 | 512 | 576 | 648   | 2048/3 | 768 | 864   | 972     |

generates 480 musical sequences with 4560 sounds. Suppose now that the same 10 notes are played in a similar way in the three possible orientations of the tetractys. This generates (3×480 = 1440) sequences of 8, 9 & 10 sounds with (3×4560 = 13680) sounds. The (7+7) enfolded, type B polygons have 1370 yods (Fig. 6), two of which are
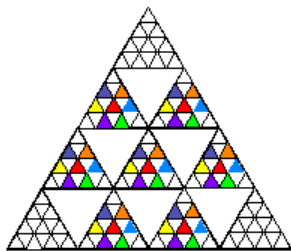


Number of notes played in (7×240 = 1680) sequences of 10 notes = 7×240×10 = 16800
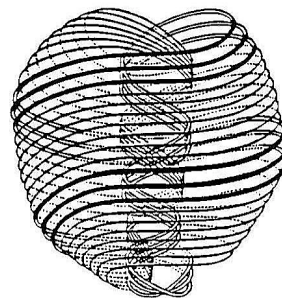


Number of spirillae in superstring = 16800

Figure 10

24 sequences of 10 notes $\longrightarrow$ whorl/string

Sequence of 10 notes $\longrightarrow$ $E_8$ gauge charge/field

Note of diatonic scale $\longrightarrow$ spirilla

the topmost corners of the two hexagons shared with the lowest corners of the hexagons enfolded in the next higher tree. The number of yods in all the polygons enfolded in the n-tree = 1368n + 2. There are therefore 13680 yods intrinsic to the

polygons enfolded in the 10-tree, that is, yods unshared with polygons enfolded in the 11th tree. This shows that the *full* musical potential of a tetractys of 10 notes is encoded in the inner form of 10 Trees of Life representing the 10 Sephiroth of a single tree. Because the tetractys and Tree of Life are equivalent symbols of the 10-fold nature of Divine Unity, what is numerically embodied in the former *has* to be identical to what is geometrically represented in the inner form of the latter.

## 2. Comparison with the Heterotic E₈×E₈ Superstring

Table 1 shows the 70 notes of 10 successive octaves of the diatonic scale. They constitute a Tree of Life pattern because, when converted into tetractyses, the 16 triangles making up a Tree of Life contain 70 yods (Fig. 7). The division of the 70 notes into the 35 notes of the first five octaves and the 35 notes of the next five octaves corresponds in the Tree of Life to the distribution of 35 yods making up its trunk[*] (shown in Fig. 7 as (●) yods) and 35 (●) yods outside it. Playing these notes arranged in seven tetractys arrays of the 10 octaves of each note of the diatonic scale (Fig. 8) generates (7×240 = 1680) musical sequences of 10 notes, making 16800 notes.

Compare this result with the fact that the UPA superstring described over 100 years ago by Annie Besant and C.W. Leadbeater consists of 10 whorls, each with 1680 spirillae, totalling 16800 spirillae. A whorl is analogous to an octave, spirillae in different whorls corresponding to different octaves of the same note. Each note of the diatonic scale has 240 sequences of its 10 octaves (Fig. 9), the counterpart of which are sets of 240 spirillae in each whorl, repeated seven times. The 240 musical sequences for each note of the diatonic scale consist of 10 sets of 24 sequences of 10 notes. The 1680 sequences for all seven notes therefore comprise 10 sets of (7×24 = **168**) sequences of 10 notes, that is 10 sets of 1680 notes (Fig. 10). The 1680 circularly polarised oscillations in each of the 10 string components of the superstring of ordinary matter have as their musical counterpart these **168** cycles. Fittingly, **168** is the number value of *Cholem Yesodeth*, the Mundane Chakra of Malkuth, signifying the physical manifestation of the Tree of Life.

The superstring counterpart of the 480 musical sequences of 8, 9 & 10 sounds is the 480 gauge charges of the gauge symmetry group E₈×E₈' for the heterotic superstring

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[*] The trunk of the Tree of Life is the geometrical sequence of point (Kether), line (Binah–Chokmah path), triangle (Chesed, Geburah & Tiphareth at its corners) and tetrahedron (Netzach, Hod, Yesod & Malkuth at its corners).

corresponding to its 480 non-zero roots. The 240 musical sequences **1˙2˙3˙4** of 10 sounds match the 240 gauge charges corresponding to the 240 non-zero roots of the gauge symmetry group $E_8$ for superstrings of ordinary matter. The 240 sequences:

| | |
|---|---|
| **1˙2˙3˙4** | **48** sequences of 10 sounds |
| **1˙2˙3˙4** | 144 sequences of nine sounds |
| **1˙2˙3˙4** | **48** sequences of eight sounds |

correspond to the 240 gauge charges associated with the 240 non-zero roots of the gauge symmetry group $E_8$' for heterotic superstrings of shadow matter. 2160 sounds are created by the 240 ways of playing a tetractys of 10 notes to generate eight, nine & 10 sounds. **216** is not only the 55th note, where 55 is the 10th triangular number, but also the **26**th whole tone ratio (1), showing how the Godname YAHVEH with number value **26** prescribes this number in the context of shadow superstrings. **216** is the number of Geburah, whose Godname number (**36**) is the number of different musical elements playable with a tetractys of 10 notes. (7×2160 = 15120) sounds are made by the 1680 ways of playing tetractys arrays of 10 successive octaves of the seven notes of the diatonic scale. As each spirilla of the superstring of ordinary matter corresponds
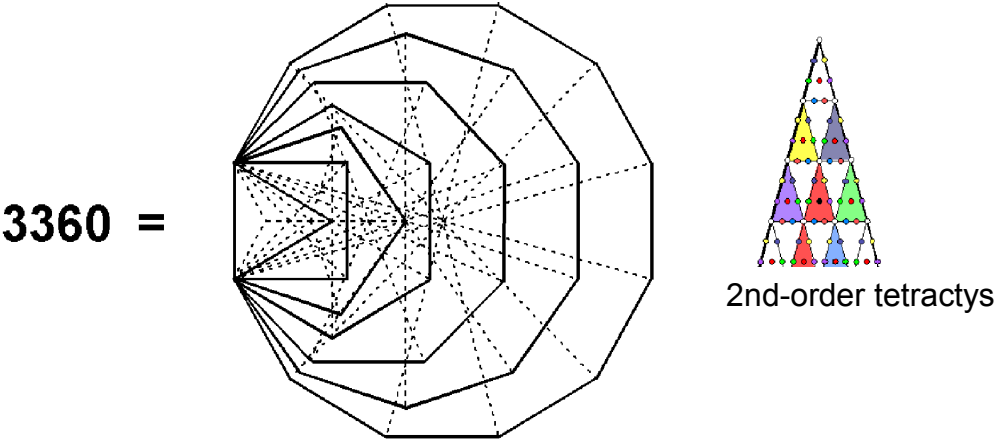


Figure 11 The number of spirillae in one of the whorls of the shadow superstring is encoded in the Tree of Life blueprint as the yod population of the seven enfolded polygons with 2nd-order tetractyses as their sectors.

to a note in the 1680 sequences of 10 sounds, this suggests that the shadow superstring is made up of 15120 spirillae instead of 16800 spirillae. As 15120 = 70×**216**, this number is generated by assigning the number value **216** of Geburah to each of the 70 yods making up the Tree of Life. Unlike ordinary superstrings, however, where the

sounds played in each sequence are the notes of the 10 octaves, this number is, in the case of shadow superstrings, not the same for the different types of sequences. This means that the sounds cannot correspond *evenly* to their whorls for each of the 1680 sequences. There are (7×**48** = 336) sequences of 10 sounds, 336 sequences of eight sounds and (7×144 = 1008 = 3×336) sequences of nine sounds. Supposing that 336 sequences correspond to a whorl, then the shadow superstring consists of five whorls instead of 10 whorls, one comprising (10×336 = 3360 spirillae, one consisting of (8×336 = 2688) spirillae and three consisting of (9×1008 = 9072) spirillae, that is, 3024 in each one. 3360 is the number of spirillae on average in each of the five revolutions of the UPA superstring. It is encoded in the inner form of the Tree of Life as the number of yods in the seven enfolded polygons when their 47 sectors are turned into 2nd-order tetractyses (Fig. 11). The 1680 sequences of eight, nine & 10 sounds produce a total of 15120 sounds corresponding to which are the 15120 spirillae of the shadow superstring, whilst the 1680 sequences of 10 notes produce 16800 notes, corresponding to which are the 16800 spirillae of the ordinary superstring. The analogy between the musical potential of the tetractys and the oscillatory nature of the heterotic superstring of ordinary matter enables one to predict the form of the heterotic superstring of shadow matter.

The conclusion that shadow superstrings have five whorls agrees with the prediction



Musical  instrument ⟷ superstring

Musical score ⟷ all superstring states
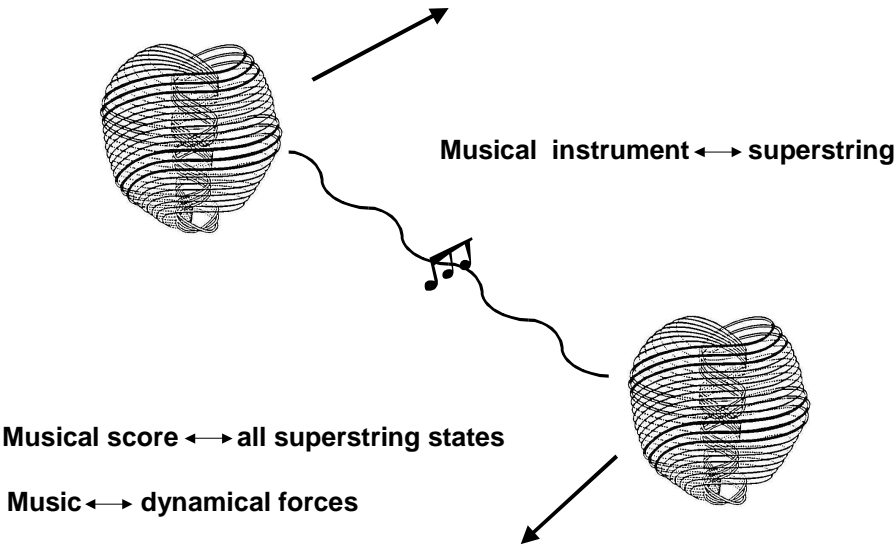
Music ⟷ dynamical forces

Figure 12

made in Article 2 that they consist of five string-like components.

The picture that emerges from this comparison of the heterotic superstring described by Besant and Leadbeater with the musical potential of a tetractys of notes drawn from 10

octaves of the diatonic scale is that superstrings are a kind of musical instrument — like a harp with 10 strings which, when plucked according to the rules given earlier, create all possible harmonic and melodic forms composed of up to four notes of the diatonic scale. The oscillations corresponding to them determine both superstring structure *and* dynamics. Superstrings are the musical instrument and their forces are like the sound vibrations that the latter emit (Fig. 12). The incessant interaction between superstrings, mediated by the exchange of the $E_8$ gauge particles, is an unheard symphony of 'sound' transmitted between these instruments. The photons of light emitted and absorbed by the electrons inside atoms would be the most common sound of this symphony, for these quanta of the electromagnetic field are but one of the gauge fields of the superstring gauge symmetry group $E_8$. Each whorl would represent 24 sequences of a tetractys of 10 octaves of each note of the diatonic scale. Those forces of nature expressed by the 240 gauge fields associated with the non-zero roots of $E_8$ have their 240 gauge charge sources in the whorls/string components of the $E_8{\times}E_8$ heterotic superstring, these charges being spread out over the strings as the counterparts of the 240 musical sequences that can be played with a tetractys of 10 octaves of each note of the diatonic scale. It is as if the basic forces acting on matter were patterns of sounds — not in air, of course, but in the sense of states of vibration of superstrings with a spin of 1. The 240 sequences associated with each note consist of 10 sets of 24 sequences, which correlate with the 24 gauge charges and their corresponding waves that travel around each whorl of the superstring. To every gauge charge there corresponds a

90 musical sounds composed of up to 4 notes can be played with a harp whose 10 strings are grouped into 1, 2, 3 & 4 strings.

90 spatial coordinate variables define the motion of the 10 string components of the heterotic superstring in 10-d space-time.
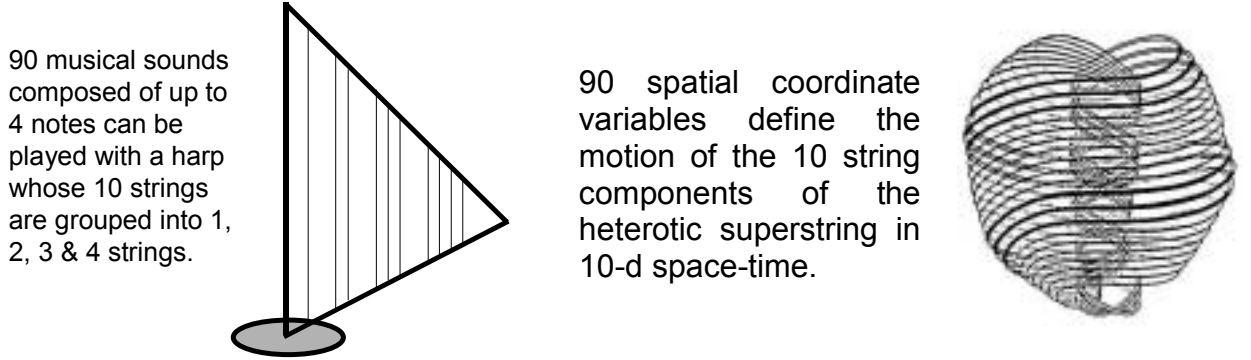


Figure 13

musical sequence, shaped according to the pattern of the tetractys, of 10 octaves of each note of the diatonic scale. Matter ultimately is a perfect harmony.

Additional evidence for the validity of this musical interpretation of the superstring is the fact that a tetractys of 10 notes can generate 90 harmonic and melodic intervals, chords

and broken chords of up to four notes (2), whilst the 10 strings of the superstring need (10×9 = 90) spatial coordinate variables to describe their motion in 10-dimensional space-time.[*] In other words, the heterotic superstring is like a 10-stringed harp or lyre (Fig. 13) whose range of musical sounds is defined by the sum (90) of integers making up the Platonic Lambda Tetractys — the very set of numbers whose relative proportions were discovered by the ancient Greeks to determine the tone ratios of the notes of the diatonic scale! As shown in reference 2, these 90 musical elements correlate with the 90 edges of the five Platonic solids. The Ideas of the Divine Mind manifest in time (music), space (Platonic solids) and space-time (superstrings) in analogous ways quantified by the same parameters.

If the musical analogy with superstring theory is correct, then the remaining (525 - 480 = 45) sequences of 4-7 sounds also require interpretation. There are two sets of sequences of seven sounds (one of 24, one of 12), six sequences of six sounds, two sequences of five sounds and one sequence of four sounds. Those other than the lattermost correspond to 44 yods on the boundaries (including the root edge) of some of the (7+7) enfolded polygons. The largest polygon — the dodecagon — has only **36** yods on its boundary, so a combination of polygons must be considered. They must be
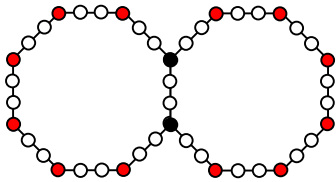


Figure 14

identical because a pair of dissimilar polygons would lead to an asymmetric distribution of the yods corresponding to the 480 sequences, which is, intuitively, unappealing. The only possible pair is the two octagons (Fig. 14). The two corners ( ● ) of their root edge denote the two sequences of five sounds, the 12 ( ● ) corners denote the 12 sequences of seven sounds and the 30 (○) yods denote the 30 sequences of either six or seven sounds. The 44 sequences *must* include four that correspond to all four yods of the root edge because no pair of similar polygons has 44 yods outside their root edge (4). This means that the 480 sequences correspond to the 288 yods inside the boundaries of the (7+7) polygons and to the 192 yods on the boundaries of all the polygons except the pair of octagons.

What is so special about an octagon? When its sectors are turned into tetractyses, its yod population is **49**, which is the number value of EL ChAI, the Godname of Yesod.

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[*] In 11-d supergravity space-time the number 90 is the number of *transverse* coordinate variables of the 10 string components of the heterotic superstring of ordinary matter, the 10 coordinate variables measured along them corresponding to the 10 notes arranged as a tetractys.

The pair of octagons has 90 yods outside their root edge and so they embody or generate the very archetypal number that we found (6) in the context of the Lambda Tetractys, the Platonic solids, the musical potential of a tetractys of 10 notes and the geometry of the heterotic superstring. Furthermore, a pair of separate, type B octagons has 240 yods surrounding their centres (5), so that they also embody this dynamical parameter of superstrings and its musical counterpart — the number of musical sequences playable with a tetractys of 10 notes. That the very polygon *not* involved in the encoding of the number 480 should define two numbers central to the musical analogy with superstrings is remarkable evidence of mathematical 'Divine Design.' Coincidence — the refuge of the sceptic — is implausible because it requires *two* fortuitous concurrences.

## 3. Conclusion

Although modern music uses the 13 notes of the tempered, chromatic scale, it originated in the West from the eight-note diatonic scale mathematically explained by Pythagoras. It is only the latter that can lay claim to have the universal validity of a law of nature as the modern musical scale is a human fabrication, a modification of the diatonic scale without any theoretical basis devised simply to increase the variety of tones available to the musician. Adhering to the earliest Greek traditions, many writers on speculative music theory have emphasized the 'cosmic' nature of the diatonic scale, pointing to its amazing, mathematical harmonies but offering little rational and scientific substantiation for this view, merely associations or correspondences with occult and religious ideas. Although this article, too, refers to a mystical tradition — Kabbalah — it makes striking *quantitative* connections with both a scientific theory and a body of information established over a hundred years ago that previous books (7) by the author have shown is profoundly consistent with established facts of nuclear and particle physics, as well as with still hypothetical ideas of this theory. This moves the present discussion from the tradition of metaphysical speculation and places it in the context of the world-wide search for an all-embracing 'theory of everything.' Popular books about superstrings often liken these vibrating strings to that of violin strings or piano wires. However, their authors never intend this comparison to be other than metaphorical. How could they, in view of the fact that the frequency range most common in music is about 500–4000 Hz, whereas superstrings may vibrate at up to $10^{43}$ Hz!? Nevertheless, such a huge difference in frequency does not imply that the mathematics of music is

irrelevant to superstring theory. It indicates only the obvious fact that the latter is not a branch of acoustics. This mathematics defines only relative, not absolute, pitches of sounds. Could it be, therefore, that an analogy relates the mathematics of music and superstring vibrations, one that makes their disparity in frequency irrelevant? Perhaps it is *not* accidental (8) that, just as musical tones group according to their pitch into sets of eight, so, too, eight mathematical objects (the so-called 'zero and seven non-zero roots of the exceptional group $E_8$') define this mathematical group describing the symmetry of the unified force between heterotic superstrings. The parallel would exist because, as shown in reference 9, superstrings — like human beings — conform to the universal pattern of the "Image of God" blueprint, and so they *must* have mathematically analogous forms of communication, whether through sound waves in the case of humans or by exchanging virtual messenger particles when superstrings interact with one another. The heterotic superstring, which the author has shown (10) is the constituent of up and down quarks in atomic nuclei, is the microscopic Tree of Life and tetractys, its 10 whorls corresponding to the 10 Sephiroth of the former and to the 10 yods of the latter. The seven notes of the diatonic scale bear a formal correspondence to the seven Sephiroth of Construction belonging to the Tree of Life. These seven objective aspects of God appear in the subatomic world as the seven compactified dimensions of space-time predicted by supergravity theory and in the heterotic superstring described by Besant & Leadbeater as the seven orders of spirillae making up each of its whorls (11), the six higher orders representing the winding of its string components about six of these dimensions curled up into one-dimensional circles (12). As Pythagoras discovered 2,500 years ago, the numbers 1, 2, 3, & 4 symbolised by the four rows of the tetractys express the relative pitches of the octave, perfect fourth and perfect fifth, leading to the beautiful, mathematical proportions of the notes of the musical diatonic scale. Similarly, the 10-fold, heterotic superstring of ordinary matter extends in 10 dimensions of space-time, both being manifestations of the universal mathematical paradigm of the tetractys governing holistic systems. Little wonder then that its forces and oscillatory form should turn out to be analogous to the musical sequences playable with tetractyses of ten octaves of each note of the diatonic scale!

## References

1) Article 12, p. 5.
2) Ibid., Section 4.

3) Ibid., Section 7.

4) The number of yods on the boundary of an n-sided, regular polygon divided into tetractyses is 3n, that is, (3n-4) yods other than the four yods on one side. Two such enfolded polygons have (2(3n-4) = 6n - 8) yods outside their shared edge. But there is no integer solution for n in the equation: 6n - 8 = 44. Therefore, no pair of similar polygons can have 44 yods outside their shared edge.

5) An n-sided, regular polygon with its sectors each divided into three tetractyses ('type B polygon') has (**15**n+1) yods. A type B octagon has (**15**×8 + 1 = 121) yods, i.e., 120 yods surround its centre. Therefore, 240 yods surround the centres of two separate type B octagons.

6) Article 11, Section 2 & 3, and Article 12, Sections 4, 5 & 7.

7) *Extra-sensory Perception of Quarks*, Stephen Phillips (Theosophical Publishing House, Wheaton, Ill., USA, 1980); *Anima: Remote Viewing of Subatomic Particles*, Stephen Phillips (Theosophical Publishing House, Adyar, Chennai, India, 1996); *ESP of Quarks and Superstrings*, Stephen Phillips (New Age International, New Delhi, India, 1999).

8) Article 12, Section 8.

9) *The Image of God in Matter*, Stephen Phillips (to be published).

10) See Ref. 7.

11) Article 2, Section 2.

12) Ibid.