Tracking the Origin
OF LIFE'S
Genetic Code

A sequel to "Revelations of a Biological Abacus"

Preamble

In a play of incredible irony, we find that amongst the findings of those scientists who currently seek a godless evolutionary explanation for the origin of life's genetic code, the 'criterion of divisibility by 037' should rather establish substantial links with a divine Creator, with His instructions concerning the Hebrews' 'wilderness experience', and with the numerical cryptogram associated with the opening words of the Judeo-Christian Scriptures.

Here we offer further evidences of the reality and significance of this criterion and also draw attention to further numerical data of a supportive nature. These features emerge from the study of, (i) the peer-reviewed paper, "A harmonic structure of the genetic code" [1] by MM Rakocevic and, (ii) the privately published article, "The numeric connections of the genetic code" [2] by J-Y Boulay. Whilst the finer details contained in these documents are, undoubtedly, matters for experts in the field, the informed layman may nevertheless participate in the essential truths revealed.

[1] M.M.Rakocevic "Journal of Theoretical Biology" 229 (2004) 221-234

[2] J-Y Boulay "The Numeric Connections of the Genetic Code": http://pagesperso-orange.fr/jean-yves.boulay/rap/eng/pagenucleon1.html

Rakocevic's contribution

A notable feature of Rakocevic's approach is his recognition of the fact that the constituent elements of the amino acids - H, C, N, O and S - are present in nature as *mixtures* of their respective isotopes. Thus, their molar masses (definition here) are not quite the whole numbers assumed by shCherbak (who based his results on the nucleon counts for each of the 20 canonical amino acids). Accordingly, Rakocevic fine-tunes the data as follows:

AMINO ACID	SYMBOL	MOLAR MASS
Alanine	Ala /A	89.09
Arginine	Arg/R	174.20
Asparagine	Asn/N	132.12
Aspartic acid	Asp/D	133.10
Cysteine	Cys/C	121.16
Glutamic acid	Glu/E	147.13
Glutamine	Gln /Q	146.14
Glysine	Gly /G	75.07
Histidine	His /H	155.15
Isoleucine	Ile /I	131.17
Leucine	Leu/L	131.17
Lysine	Lys /K	146.19
Methionine	Met/M	149.21
Phenylalanine	Phe/F	165.19
Proline	Pro /P	115.13
Serine	Ser /S	105.09
Threonine	Thr/T	119.12
Tryptophan	Trp/W	204.23
Tyrosine	Tyr /Y	181.19
Valine	Val /V	117.15

TABLE 1

The 20 amino acids with their 3- and 1-letter symbols and molar masses

[Observe here that when the constituent elements (C, H, N, O and S) are represented by their most abundant isotopes the integer part of each molar mass value corresponds precisely with the total nucleon count (i.e. protons + neutrons); the fractional part reflects the reality that other isotopes of these elements are present in the forms found to occur naturally]

These data may be readily verified by accessing the links provided as an appendix to this page.

Rakocevic now sets out the data as a 5x4 matrix of molar masses (his reasons for choosing this particular arrangement are to be properly understood only by experts in the field; clearly, from the layman's point of view, the fact that they were accepted by a panel of his peers is all that really matters):

	1	2	3	4	ROW TOTALS
1	Asp/D 133.10	Asn/N 132.12	Ala /A 89.09	Leu/L 131.17	485.48
2	Arg/R 174.20	Phe/F 165.19	Pro /P 115.13	Ile /I 131.17	585.69
3	Lys /K 146.19	Tyr/Y 181.19	Thr/T 119.12	Met/M 149.21	595.71
4	His /H 155.15	Trp/W 204.23	Ser/S 105.09	Cys/C 121.16	585.63
5	Glu /E 147.13	Gln /Q 146.14	Gly /G 75.07	Val /V 117.15	485.49
COLUMN TOTALS	755.77	828.87	503.50	649.86	2738.00

$$1332.37 = 2 \times 666 + 0.37$$
$$1405.63 = 2 \times 703 - 0.37$$
$$= 37 \times 74$$
$$= 2 \times 37^2$$

TABLE 2

The distribution of molar mass into 4 quintets and 5 quartets
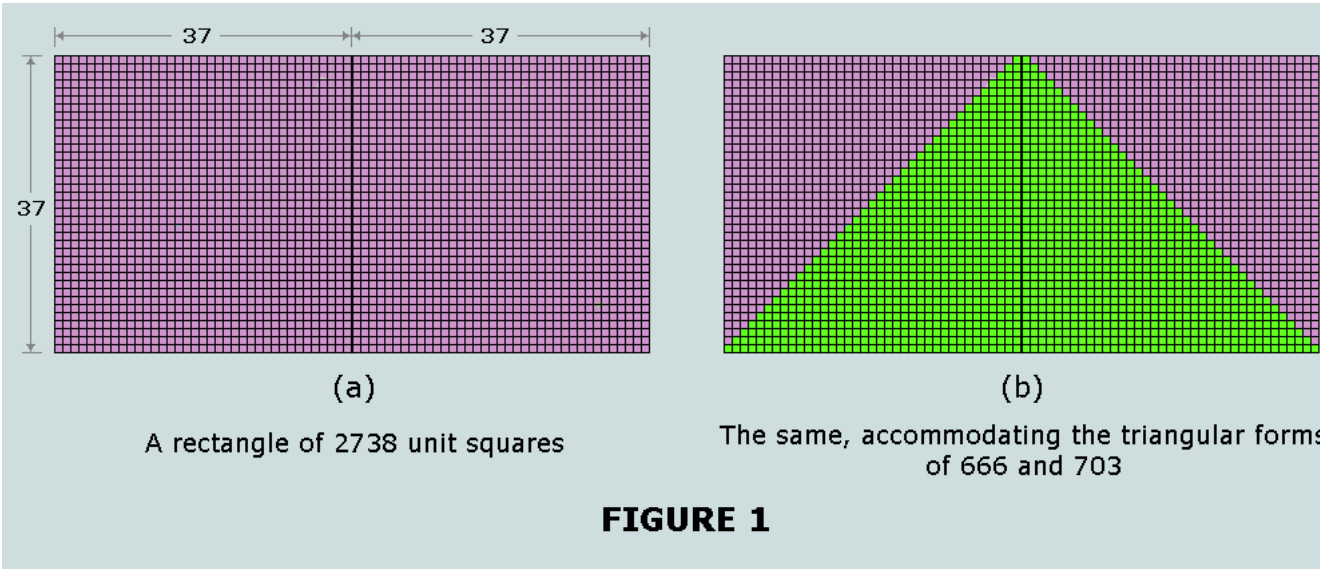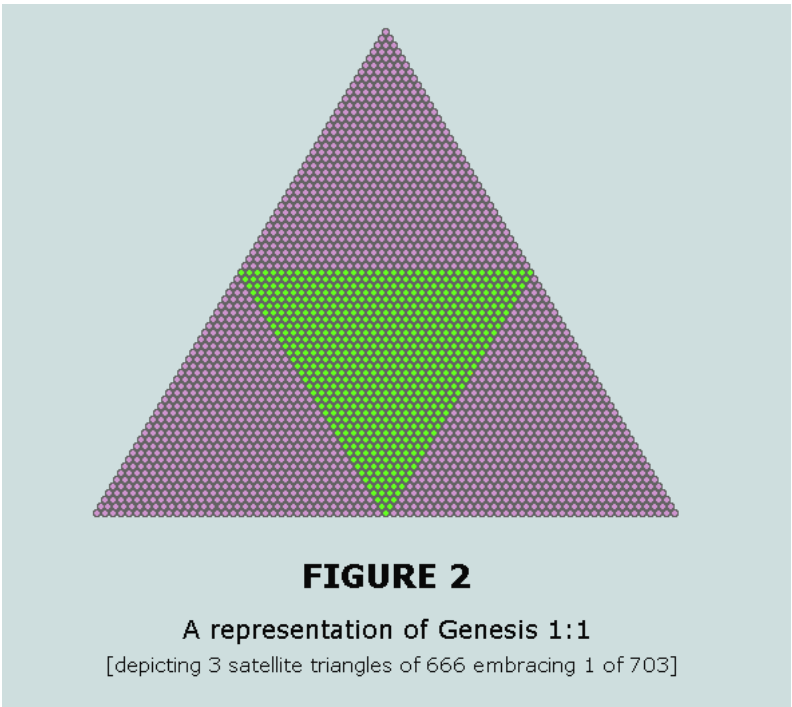
Observe here:

- the grand total of the molar masses of the 20 amino acids is 2738 [= 37x74 = 2x37x37, precisely!]

- the sum of columns 1 and 4 is 1405.63 [= 1406 - 0.37 = (37x38) - 0.37 = (2x703) - 0.37

- the sum of columns 2 and 3 is 1332.37 [= 1332 + 0.37 = (37x36) + 0.37 = (2x666) + 0.37

- alternating sums of the tabular elements (details here) yield 1331.45 and 1406.55, respectively, which again converge on the integers 1332 and 1406 - this time with an orb of allowance of 0.55

- concerning the row totals: row 1 corresponds closely with row 5, and row 2 with row 4; we may therefore envisage the table's value, 2738, to be bisected by a horizontal line passing through the centre of the third row - yielding the square of 37 both above and below, thus:

	1	2	3	4	ROW TOTALS		
1	Asp/D 133.10	Asn/N 132.12	Ala /A 89.09	Leu /L 131.17	485.48		
2	Arg/R 174.20	Phe /F 165.19	Pro /P 115.13	Ile /I 131.17	585.69	1369.025	
3	Lys /K 146.19	Tyr /Y 181.19	Thr /T 119.12	Met/M 149.21	297.855	$= 37^2 + 0.025$	
4	His /H 155.15	Trp /W 204.23	Ser /S 105.09	Cys/C 121.16	297.855 585.63	1368.975	
5	Glu /E 147.13	Gln /Q 146.14	Gly /G 75.07	Val /V 117.15	485.49	$= 37^2 - 0.025$	
COLUMN TOTALS	755.77	828.87	503.50	649.86	2738.00		

1332.37
$= 2 \times 666 + 0.37$

1405.63
$= 2 \times 703 - 0.37$

$= 37 \times 74$
$= 2 \times 37^2$

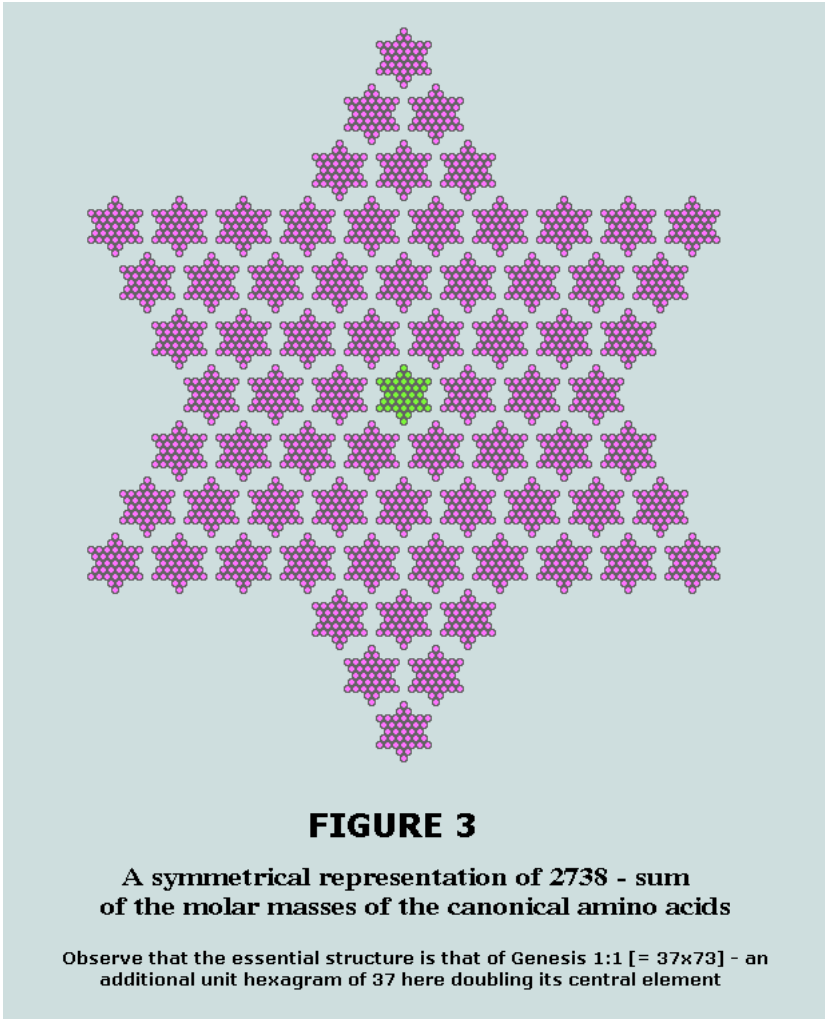**TABLE 3**

The molar mass divisions

These divisions are captured in the following expressions of numerical geometry:

(a) A rectangle of 2738 unit squares

(b) The same, accommodating the triangular forms of 666 and 703

FIGURE 1

This clearly invites a comparison with the structure of the Hebrew Bible's first verse - the 1998 purple counters (representing the sum of the CVs of the opening 5 words) assembled into three equilateral triangles of 666, and the 703 green counters (sum of the CVs of the next two words, translated "... and the earth.") forming the central triangle.

FIGURE 2

A representation of Genesis 1:1

[depicting 3 satellite triangles of 666 embracing 1 of 703]

Further, some compound numerical geometries capture the same features:

FIGURE 3

A symmetrical representation of 2738 - sum
of the molar masses of the canonical amino acids

**Observe that the essential structure is that of Genesis 1:1 [= 37x73] - an
additional unit hexagram of 37 here doubling its central element**

Observe again, (i) that the doubling places 2x37 (= 74, the value of the standard block) at the very centre of proceedings and, (ii) the sum of the ordinal positions of the letters of the English 'JESUS' also being 74, the Creator, most appropriately, occupies the same position!

The compound geometries here reveal 703 as a symmetrical hexagon of 19 units of 37-as-hexagram centrally placed within, first, a hexagon of 37 such units (representing a total of 1369 counters) and, again, within a hexagram of 37 of the same units. Clearly, the outlines of each of these larger figures comprise 18 units of 37-as-hexagram - a total of 666 counters.

FIGURE 4

Two symmetrical arrangements of the pair 666/703
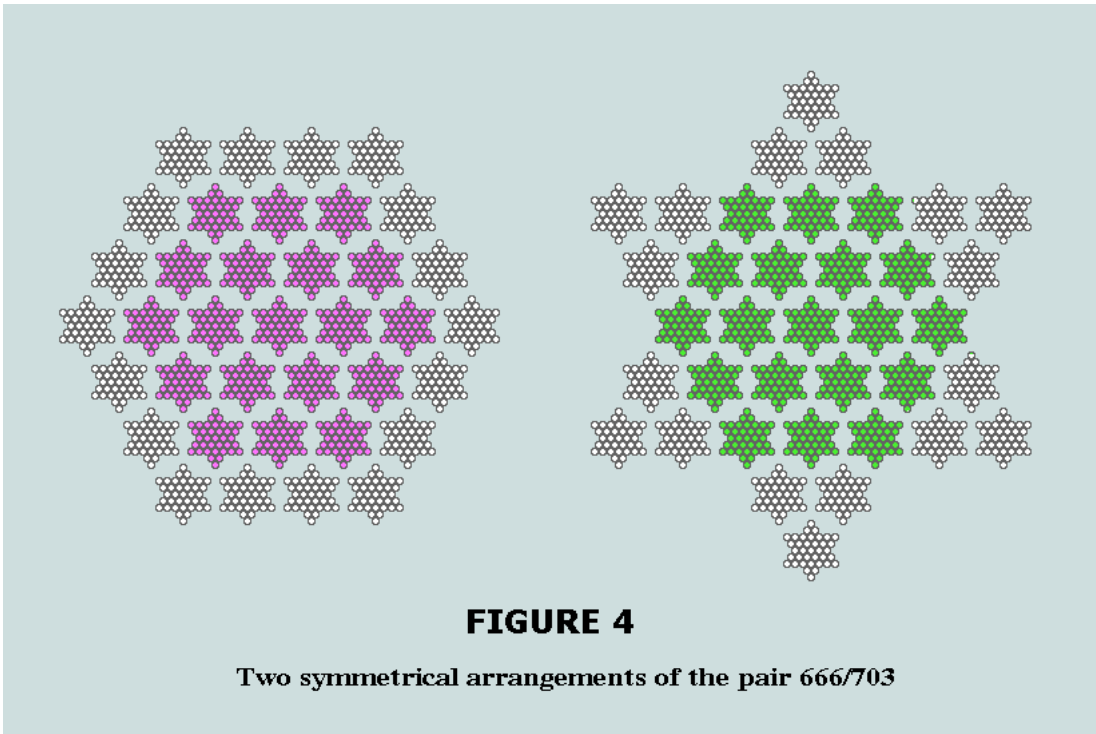
Boulay's contribution

Here we return to the integer particle counts associated with the most abundant isotopes of the life-forming elements. Boulay begins by drawing attention to 2 anomalies in the universal genetic code:

- the rogue behaviour of the amino acid proline and,

- what he refers to as the 'rebel group' of codons

The proline problem

In common with shCherbak, Boulay's evidence rests upon a satisfactory resolution of the 'proline problem', i.e. the fact that it is the only amino acid that fails to conform with the generic formula

$$ \begin{array}{ccc} R & & R \\ | & \longrightarrow & | \\ B & & H_2NCHCO_2H \end{array} $$

[R representing the 'radical' or 'side chain', and B the 'base' or 'standard block']

For 19 of the canonical amino acids the nucleon count for the standard block is 74, whereas that for proline is 73. shCherbak's solution involves moving a hydrogen atom (or proton) from R to B - thus standardising both atom and nucleon counts for B but decreasing those of R (respectively, 9 and 42) each by one. On the other hand, Boulay posits a neutron from R functioning as a proton as it connects to the base; the result - an extra proton (and atom) in B and one fewer neutrons in R. Clearly, both schemas leave the total nucleon count unaffected. There follows a summary of these proceedings.

INVESTIGATOR	PARTICLE COUNTS											
	STANDARD BLOCK				SIDE CHAIN				TOTALS			
	A	P	N	Nc	A	P	N	Nc	A	P	N	Nc
shCherbak (S)	9	39	35	74	8	23	18	41	17	62	53	115
Boulay (B)	9	39	35	74	9	24	17	41	18	63	52	115

TABLE 4

A comparison of particle countings for the rogue amino acid proline
[A = Atoms, P = Protons, N = Neutrons and Nc = Nucleons]

Boulay defends the validity of both these manoeuvres as follows:

"Without these two special countings, the very numerous and organised phenomena presented by shCherbak and Boulay disappear. (But they) are much too numerous and structured to be destroyed by an apparent contradiction of chemical arrangement."

Let us also observe that Rakocevic's approach, as outlined above, avoids the 'proline problem' entirely by focusing attention on phenomena associated with the molar weights of the amino acids rather than their particle counts. He therefore establishes the primacy of 037 quite independently of these conjectures. Thus, remarkably, the assumptions of both shCherbak and Boulay, in leading to the same conclusion, appear to be equally valid.

The 'rebel group'

As Table 5 reveals, it is generally the case that amino acid products are identical if the final base of the codon is either A or G, or T or C (or U or C). The exceptions are here highlighted: ATA/AUA delivers isoleucine (Ile/I), whereas ATG/AUG, methionine (Met/M); TGA/UGA, 'stop', and TGG/UGG, tryptophan (Trp/W). [In passing, we observe that only 61 of the 64 codons are producers of amino acids.]

TABLE 5

The universal genetic code with
Boulay's 'rebels' highlighted

Taking one of shCherbak's observations as an example of the significance of the foregoing, Boulay first points to this investigator's original table depicting the dominance of multiples of 37 among the particle counts of the 20 amino acids:

Subset 1

AMINO ACID	NUCLEONS IN BASE	NUCLEONS IN RADICAL	NUCLEON TOTAL
Gly /G	74	1	75
Ala /A	74	15	89
Ser /S	74	31	105
Pro /P	74	41	115
Val /V	74	43	117
Thr /T	74	45	119
Leu /L	74	57	131
Arg/R	74	100	174
8	592 [4×4×37]	333 [3×3×37]	925 [5×5×37]

Subset 2

AMINO ACID	NUCLEONS IN BASE	NUCLEONS IN RADICAL	NUCLEON TOTAL
Ser /S	74	31	105
Cys/C	74	47	121
Leu /L	74	57	131
Ile /I	74	57	131
Asn/N	74	58	132
Asp/D	74	59	133
Gln/Q	74	72	146
Lys /K	74	72	146
Glu/E	74	73	147
Met/M	74	75	149
His /H	74	81	155
Phe /F	74	91	165
Arg/R	74	100	174
Tyr /Y	74	107	181
Trp/W	74	130	204
15	1110 [2×3×5×37]	1110 [2×3×5×37]	2220 [3×4×5×37]

TABLE 6

Two subsets of the amino acids which have
nucleon numbers multiples of 37

[The 'rebel' products depicted in red]

The first subset comprises the 8 amino acids which are observed to be encoded 4 times in Table 5 - with the first two bases identical; in the second, the remainder which are encoded 1-, 2-, or 3-times - again, the first two bases being identical.

Now follow Boulay's additional observations involving the 'rebels':

Subset 1

AMINO ACID	TOTAL NUCLEONS	RELATED CODONS	NUCLEON GRAND TOTAL
Gly /G	75	2+2	300
Ala /A	89	2+2	356
Ser /S	105	2+2	420
Pro /P	115	2+2	460
Val /V	117	2+2	468
Thr /T	119	2+2	476
Leu /L	131	2+2	524
Arg /R	174	2+2	696
8	925 [5x5x37]	32 [4x8]	3700 [10x10x37]

Subset 2

AMINO ACID	TOTAL NUCLEONS	RELATED CODONS	NUCLEON GRAND TOTAL
(STOP)	(0)	(2+1)	(0)
Ser /S	105	2	210
Cys /C	121	2	242
Leu /L	131	2	262
Ile /I	131	2+1	393
Asn /N	132	2	264
Asp /D	133	2	266
Gln /Q	146	2	292
Lys /K	146	2	292
Glu /E	147	2	294
Met /M	149	2 – 1	149
His /H	155	2	310
Phe /F	165	2	330
Arg /R	174	2	348
Tyr /Y	181	2	362
Trp /W	204	2 – 1	204
16	2220 [3x4x5x37]	32 [2x16+2-2]	4218 [6x19x37]

TABLE 7

The same subsets with 'rebels' removed

Here, the 'Total Nucleons' (column 2) is a straight copy of 'Nucleon Total' (Table 6, column 4), and refers to a <u>single</u> occurrence of the related amino acid. However, each amino acid normally occurs <u>several times</u> as a codon product in the Genetic Code (see Table 5); the precise number of times is recorded in column 3, above. Thus, the 'Nucleon Grand Total' (column 4) is the product of the related columns 2 and 3.

For the first subset, the total of nucleons is, of course, a multiple of 37 because each amino acid (AA) normally occurs twice. For the second, though not all represented twice, the total is nevertheless a multiple of 37.

Some additional features of Boulay's work, worthy of close attention, are summarised in the following table:

Particles	In the base of each amino acid	In all amino acids	In the 'rebel group'	In all amino acids without the 'rebel group'
NUCLEONS	74 [= 37x2]	7918 [=37x214]	484 [= 121x4]	7434 [= 7x1062]
PROTONS	39 [= 13x3]	4264 [= 13x328]	260 [= 13x20]	4004 [= 13x7x44]
NEUTRONS	35 [= 7x5]	3654 [= 7x522]	224 [= 7x32]	3430 [= 7x7x7x10]

TABLE 8

Further interesting particle counts

Here we find that the particle sums for each of the amino acid bases and for the complete output of the 61 productive codons are multiples of 37 (the nucleons), 13 (the protons) and 7 (the neutrons). The derivation of these figures requires a scrutiny of the two following tables, in which is further revealed the potent fact that the total atom count is 1147, or 37x31.

Element	Approx Atomic Mass of most common isotope	Atomic Mass natural isotope mixture
H	1	1.008
C	12	12.011
N	14	14.007
O	16	15.999
S	32	32.006

Atomic masses of the most common elements

$$R$$
$$|$$
$$H_2NCHCO_2H$$

Amino acid: generic formula
[side chain (R) and
standard block (Std Blk)]

AMINO ACID	Empirical Composition					Atoms	Nucleons			DNA/RNA PF
	C	H	N	O	S		Protons	Neutrons	Total	
Std Blk	2	4	1	2	0	9	39	35	74	61
Ala /A	3	7	1	2	0	13	48	41	89	4
Arg /R	6	14	4	2	0	26	94	80	174	6
Asn /N	4	8	2	3	0	17	70	62	132	2
Asp /D	4	7	1	4	0	16	70	63	133	2
Cys /C	3	7	1	2	1	14	64	57	121	2
Glu /E	5	9	1	4	0	19	78	69	147	2
Gln /Q	5	10	2	3	0	20	78	68	146	2
Gly /G	2	5	1	2	0	10	40	35	75	4
His /H	6	9	3	2	0	20	82	73	155	2
Ile /I	6	13	1	2	0	22	72	59	131	3
Leu /L	6	13	1	2	0	22	72	59	131	6
Lys /K	6	14	2	2	0	24	80	66	146	2
Met /M	5	11	1	2	1	20	80	69	149	1
Phe /F	9	11	1	2	0	23	88	77	165	2
Pro /P	5	10	1	2	0	18	63	52	115	4
Ser /S	3	7	1	3	0	14	56	49	105	6
Thr /T	4	9	1	3	0	17	64	55	119	4
Trp /W	11	12	2	2	0	27	108	96	204	1
Tyr /Y	9	11	1	3	0	24	96	85	181	2
Val /V	5	11	1	2	0	19	64	53	117	4

TABLE 9

Details of the particular compositions of the amino acids

AMINO ACID	Particles in the Individual Amino Acids				DNA/RNA PF*	Particles in the Products of the Genetic Code			
	Atoms	Protons	Neutrons	Total		Atoms	Protons	Neutrons	Total
Std Blk	9	39	35	74	61	549	2379	2135	4514
Ala /A	13	48	41	89	4	52	192	164	356
Arg /R	26	94	80	174	6	156	564	480	1044
Asn/N	17	70	62	132	2	34	140	124	264
Asp/D	16	70	63	133	2	32	140	126	266
Cys/C	14	64	57	121	2	28	128	114	242
Glu /E	19	78	69	147	2	38	156	138	294
Gln /Q	20	78	68	146	2	40	156	136	292
Gly /G	10	40	35	75	4	40	160	140	300
His /H	20	82	73	155	2	40	164	146	310
Ile /I	22	72	59	131	3	22/44	72/144	59/118	131/262
Leu/L	22	72	59	131	6	132	432	354	786
Lys /K	24	80	66	146	2	48	160	132	292
Met/M	20	80	69	149	1	20	80	69	149
Phe/F	23	88	77	165	2	46	176	154	330
Pro /P	18	63	52	115	4	72	252	208	460
Ser/S	14	56	49	105	6	84	336	294	630
Thr/T	17	64	55	119	4	68	256	220	476
Trp/W	27	108	96	204	1	27	108	96	204
Tyr/Y	24	96	85	181	2	48	192	170	362
Val /V	19	64	53	117	4	76	256	212	468

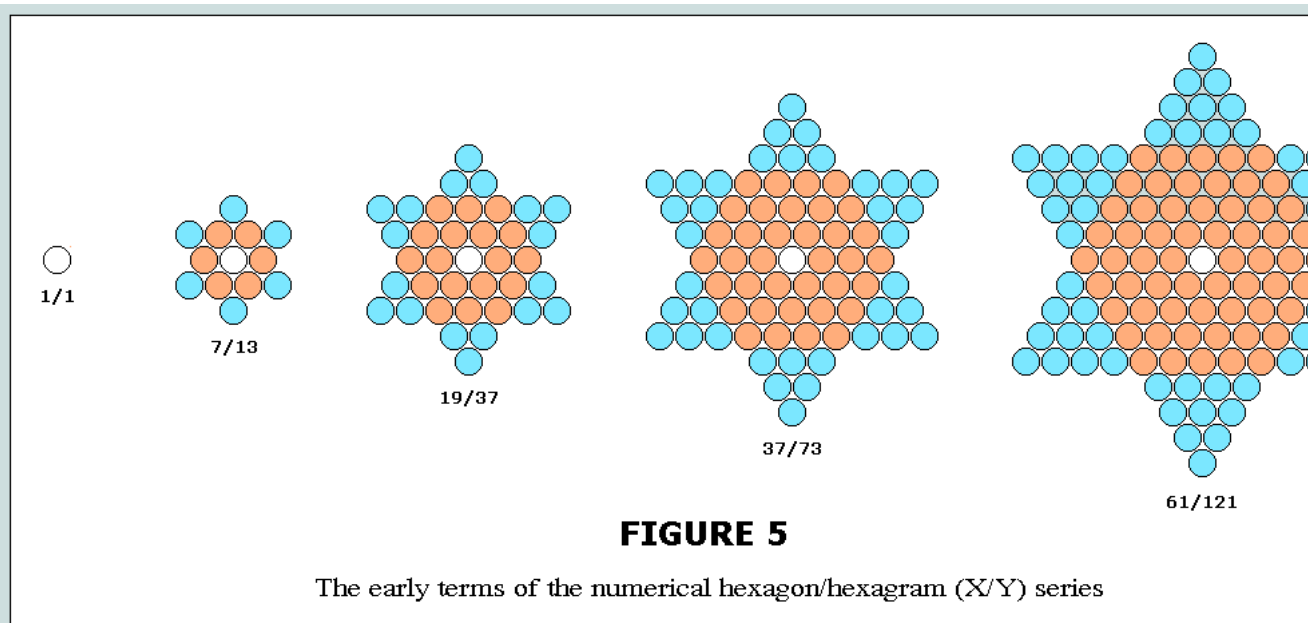| Totals	'rebels' included	1147	4264	3654	7918
	'rebels' excluded	1078	4004	3430	7434

TABLE 10

The particular implications of the amino acids appearing
a total of 61 times as codon products

* PF represents 'product frequency'
i.e. the number of times a given amino acid appears
as a product in the DNA/RNA table of 64 codons

Observe here the splitting of the figures for isoleucine (Ile/I) because it features as a 'rebel' only once, but twice as a regular AA.

The figurate number associations

Boulay has clearly overlooked some additional, potentially significant, features of the foregoing results. For example, he might have pointed to the impressive pedigree of 37 as a number, *per se,* together with those matters of further interest and relevance that derive from its properties.

1/1
7/13
19/37
37/73
61/121

FIGURE 5

The early terms of the numerical hexagon/hexagram (X/Y) series

As revealed above, it is present in both hexagon and hexagram series of figurate numbers - a most rare event (there being only 2 more instances in the first million natural numbers). But it has yet a third symmetrical form as truncated square, thus:
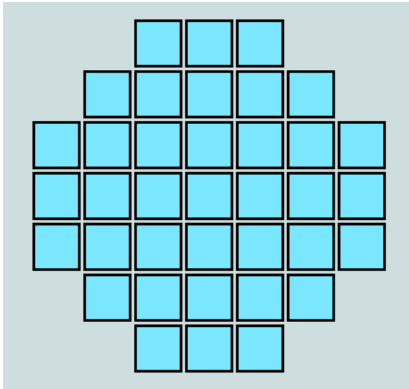

Clearly, therefore, 37 is a trifigurate number - sharing this exalted status with only one other number, 91. Interestingly, 91 = 7x13, i.e. the product of 2nd hexagon and related hexagram, as depicted above. But there are yet further examples selected from these series among the foregoing results; for example, 703 = 19x37; number of AA-producing codons = 61; large factor of nucleons in the rebel group = 121; and unadjusted proline nucleon count = 73.

One feature of considerable significance emerges here: namely, that the product of hexagon (X, say) by related hexagram (Y, say) always gives rise to a triangular number (appropriately termed an XY-triangle). This is made clear in the next figure.

FIGURE 6

The early XY-triangles and their biblical implications
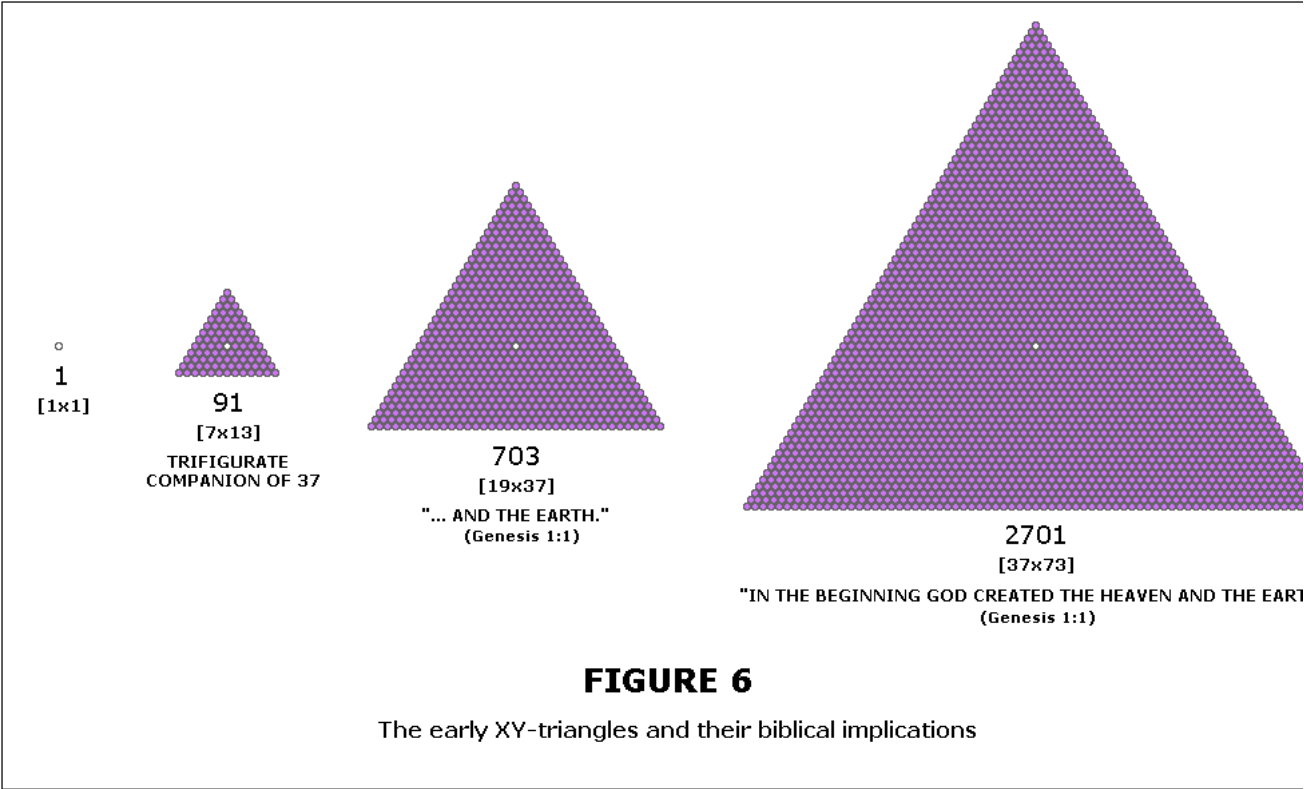
The repunit associations

Boulay further draws attention to the interesting pattern depicted below in which 11 is revealed as a prominent feature of the proton sums of the canonical amino acids found in the genetic code table, 'rebels' excluded (proceed here for further details). Clearly, he has uncovered matters of some consequence.

FIGURE 7

The sum of the protons in each of the symmetrical
coloured groups is a multiple of 11
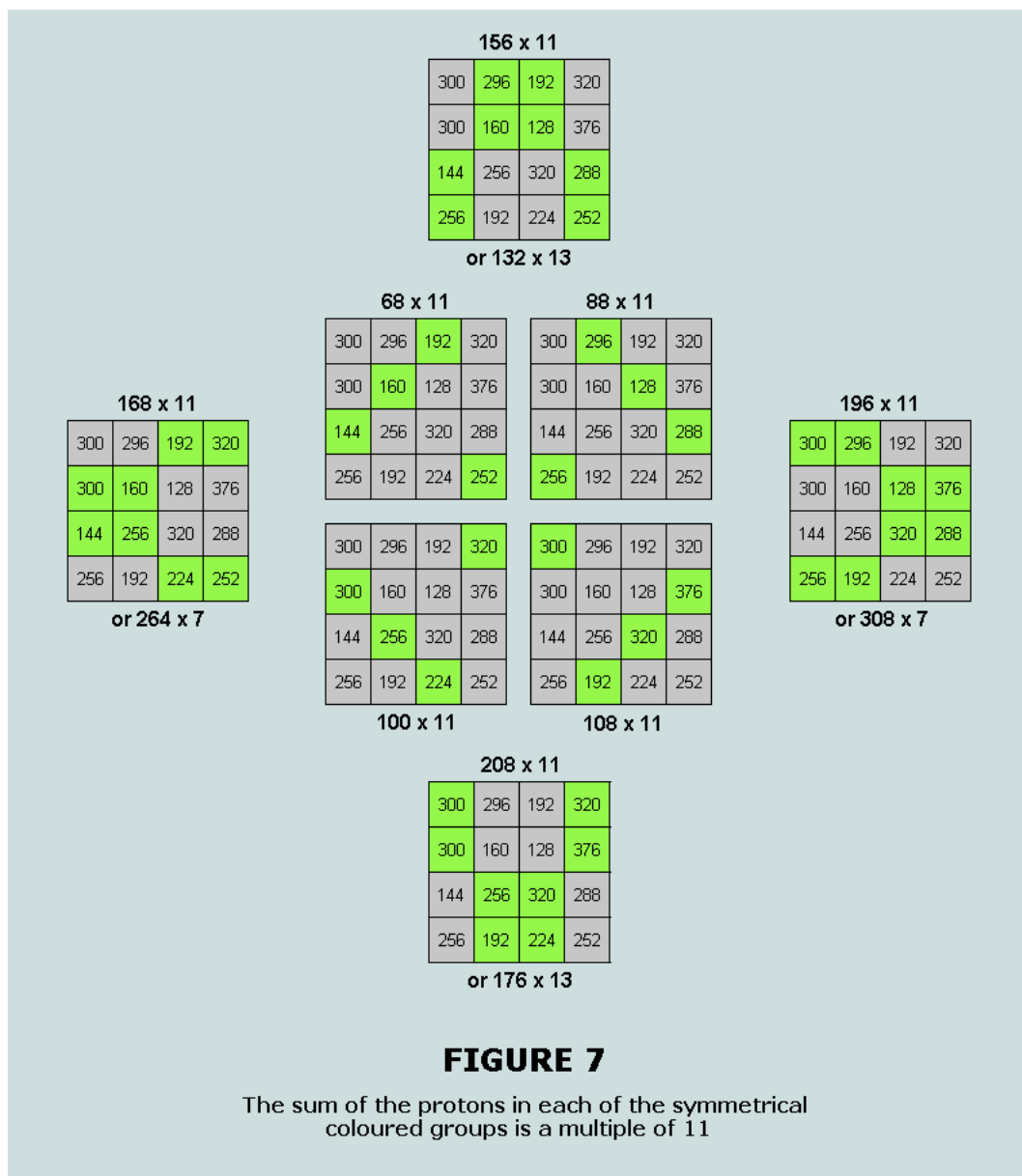
Observe that 11 is the root prime for 2-digit repdigits, just as 37 is the root prime for 3-digit repdigits. Extending into 6-digit repunits, the entire set of [7, 11, 13, 37] is involved, as 111111 = 3 x 7 x 11 x 13 x 37. Interestingly, the sum of the CVs of the Bible's first eight Hebrew words is 3003, or 3 x 7 x 11 x 13 - 77th triangular number.

A final word from shCherbak

"Physics and chemistry are indifferent to the internal syntax of numerical language of arithmetic and, in particular, to the number system that this language employs. All they require from arithmetic is quantitative data. Absence of a privileged numerical system inherent to an object must therefore be a necessary condition of its natural origin. Recent research, however, has found an exception. That object is the universal genetic code. The genetic code turns out to be a syntactical structure of arithmetic, the result of unique summations carried out by some primordial abacus at least three and a half billion years ago. The decimal place-value numerical system with a zero conception was used for that arithmetic. It turned out that the zero sign governed the genetic code not only as an integral part of the decimal system, but also directly as an acting arithmetical symbol. Being non-material abstractions, all the zero, decimal syntax, and unique summations can display an artificial nature of the genetic code. They refute traditional ideas about the stochastic origin of the genetic code. A new order in the genetic code hardly ever went through chemical evolution and, seemingly, originally appeared as pure information like arithmetic itself."

[the abstract to his "The Arithmetic Origin of the Genetic Code" which appears (2008) as a chapter in the book "The Codes of Life" ISBN 978-1-4020-6340-4 (Online)]

Clearly, shCherbak has particularly in mind the eye-catching repdigits 111, 222, etc. which so frequently appear in the particle counts as described above. These represent multiples of 37 only as mediated by 10 in the decimal place-value system of numeration. And that system has only become known to man over the last millennium, or so; and only universally recognised and used by him within recent centuries. It must follow that the genetic code is an artefact. Whether directly, or by a process of infinite regression, its true Author must therefore be the Judeo-Christian Creator of all things. Significantly, the logic of shCherbak's argument is not extended by him to encompass this final step.

Conclusions

The reality of the appearance of 37 (now including its numero-geometrical analogues, 7, 13, 19, 61, 73 and 121, besides its multiples, 666 and 703), among the various particle counts of the 20 canonical amino acids is now supported in the writings of two experts in the field of genetics, viz. shCherbak and Rakocevic, and in the writings of a significant contributor to the nascent field of bioinformatics, Boulay. Clearly, these individuals have independently stumbled upon a matter of supreme importance, viz. that of directly relating the Creator with certain of the *modi operandi* of His Creativity!

So, on what rational grounds will Richard Dawkins *et al* continue to preach militant atheism? And, our team of investigators having inadvertently provided proof of the Being and Sovereignty of God, on what rational grounds will evolutionists continue to insist on 'dinosaurs before birds', when the Creator has clearly declared, 'birds before dinosaurs' (Genesis 1: 20-25)?!

Vernon Jenkins MSc

2010-03-22

Wikipedia Links for the properties of each of the canonical amino acids:

> http://en.wikipedia.org/wiki/Alanine
> http://en.wikipedia.org/wiki/Arginine
> http://en.wikipedia.org/wiki/Asparagine
> http://en.wikipedia.org/wiki/Aspartic_acid
> http://en.wikipedia.org/wiki/Cysteine
> http://en.wikipedia.org/wiki/Glutamic_acid
> http://en.wikipedia.org/wiki/Glutamine
> http://en.wikipedia.org/wiki/Glycine
> http://en.wikipedia.org/wiki/Histidine
> http://en.wikipedia.org/wiki/Isoleucine
> http://en.wikipedia.org/wiki/Leucine
> http://en.wikipedia.org/wiki/Lysine
> http://en.wikipedia.org/wiki/Methionine
> http://en.wikipedia.org/wiki/Phenylalanine
> http://en.wikipedia.org/wiki/Proline
> http://en.wikipedia.org/wiki/Serine
> http://en.wikipedia.org/wiki/Threonine
> http://en.wikipedia.org/wiki/Tryptophan
> http://en.wikipedia.org/wiki/Tyrosine
> http://en.wikipedia.org/wiki/Valine