The numeric connections of the genetic code

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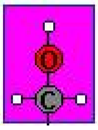
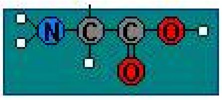
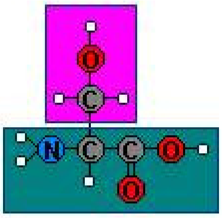
INTRODUCTION

The number of protons contained in every amino acid and the configuration of DNA bases of their respective genetic coding are connected by numeric phenomena.
These phenomena consist into effects of multiples of prime numbers including the totality of the relations enters the configuration of the genetic code (64 codons) and the values of the numbers of protons (or atomic numbers) in the 64 coded amino acids (61 amino acids and 3 stop).
These phenomena describe important effects of a symmetry as for their distributions in the table of the genetic code.
These phenomena of symmetric multiples imply prime numbers:
7 - 11 - 13

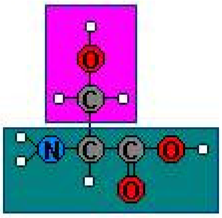
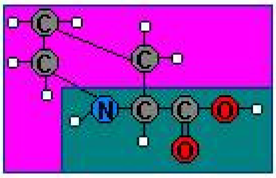
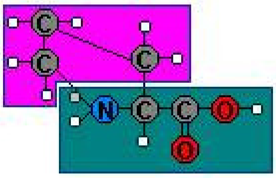
Study technical depiction

The presented phenomena concern the **total protons number** included in the radical + in the base of the 64 coded amino acids (61 amino acids and 3 stop). Example for the serine: 17 protons (radical) + 39 protons (common base) = 56 protons.

Common amino acids structure (for example here SER)		
radical	base	Complete AA
		

Specificity of the proline:

The amino acid proline, has a very particular structure. It is the only among all whose radical has a even number of protons. All other amino acids have an odd radical and organized on the common base (39 protons: also odd) form all a complete molecule possessing a even number of protons. The proline should lose a proton (a hydrogen) during its association on the base to form too a molecule in even number of protons. It is also the only amino acid with two electronic liaisons between the radical and the base.

<table>
<tr><td colspan="2">Amino acids structure</td></tr>
<tr><td>Common amino acids structure
One only electronic liaison between the base and the radical. All the amino acid with the same common base.

Radical zone Base zone</td><td>Particular proline structure
Two electronic liaisons between the base and the radical. One hydrogen atom lost in the base.

Radical zone Base zone</td></tr>
<tr><td colspan="2">In this study, the proline hydrogen atom lost is nevertheless accounted:

So, in this study, the protons account of the proline is equal to 63</td></tr>
</table>

So, in this study, it is accounted for the proline 24 protons in the radical zone + 39 protons in the base zone, so a total number of protons equal to 63. It is the total number of protons of the proline’s radical + the one included in the common base of alls the amino acids.

Without this special account, the totality of the very numerous phenomena described in this study are completely destroyed.

The proline is also, and not by chance, in the centre of numerous presented phenomena.

Study technical depiction

In this study, the relations " codon-coded " are described mainly so:

Three letters CCG	**94 A number**
The codon	**Total of protons**
being described by three DNA bases	Being contained in the coded amino acid radical + in the base of amino acid (**not gathered chemically)**

Example of a codon and a coded (here the arginine) constituted of:

Atom	atoms number	protons number	Total protons number
Hydrogen	**14**	**14**	**94** in the coded amino acid radical + in amino acid base **not gathered chemically**
Carbon	**6**	**36**	
Nitrogen	**4**	**28**	
Oxygen	**2**	**16**	
Sulphur	**0**	**0**	

Systematically, it seems that the coded are identical if the final base of the codon is **A either G** or if this base is **T or C**. This except for a named group ***the rebel group*** : ATA72 , ATG80, TGG108 and TGA (STOP). The **total protons number** of this group is 260: **20 times prime number 13**.
The rebel group set apart, codons code for the same coded **if and only if** their last base is or **A or G** or **T or C**.
In this group: was coded ATG80, **the methionine**, the fundamental sulphured amino acid (**ATG** is the **initiator codon)**. Also in this group: was coded TGG108, **the tryptophan** (the more large protons number coded). Also in this group: was coded TGA (STOP).

VERY IMPORTANT ESTABLISHED PHENOMENA

The rebel group set apart, the codons code for the same coded
➡ **if and only if their last base is A or G**
➡ **if and only if their last base is T or C**

FIRST PART OF THE STUDY NO INCLUDING THE REBEL GROUP INTO ACCOUNTS

First part study technical introduction

The following table describes the whole genetic code: the three bases of the codon, the coded amino acid and the number of protons contained in the coded amino acid. In fat the totals accumulated by protons appear. The values of **the rebel group** are not taken into accounts.

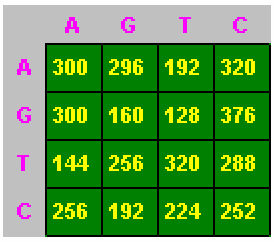
Table of the genetic code

AAA	LYS	80	GAA	GLU	78	TAA	STOP	0	CAA	GLN	78	236	
AAG	LYS	80	GAG	GLU	78	TAG	STOP	0	CAG	GLN	78	236	
AAT	ASN	70	GAT	ASP	70	TAT	TYR	96	CAT	HIS	82	318	
AAC	ASN	70	GAC	ASP	70	TAC	TYR	96	CAC	HIS	82	318	
		300			296			192			320		1108
AGA	ARG	94	GGA	GLY	40	**TGA**	**STOP**	**0**	CGA	ARG	94	228	
AGG	ARG	94	GGG	GLY	40	**TGG**	**TRP**	**108**	CGG	ARG	94	228	
AGT	SER	56	GGT	GLY	40	TGT	CYS	64	CGT	ARG	94	254	
AGC	SER	56	GGC	GLY	40	TGC	CYS	64	CGC	ARG	94	254	
		300			160			128			376		964
ATA	**ILE**	**72**	GTA	VAL	64	TTA	LEU	72	CTA	LEU	72	208	
ATG	**MET**	**80**	GTG	VAL	64	TTG	LEU	72	CTG	LEU	72	208	
ATT	ILE	72	GTT	VAL	64	TTT	PHE	88	CTT	LEU	72	296	
ATC	ILE	72	GTC	VAL	64	TTC	PHE	88	CTC	LEU	72	296	
		144			256			320			288		1008
ACA	THR	64	GCA	ALA	48	TCA	SER	56	CCA	PRO	63	231	
ACG	THR	64	GCG	ALA	48	TCG	SER	56	CCG	PRO	63	231	
ACT	THR	64	GCT	ALA	48	TCT	SER	56	CCT	PRO	63	231	
ACC	THR	64	GCC	ALA	48	TCC	SER	56	CCC	PRO	63	231	
		256			192			224			252		924
		1000			904			864			1236		4004

Distribution of the total number of protons
(excluded the rebel group)

Base rank	Base A	Base G	Base T	Base C
Rank 1	**1000**	**904**	**864**	**1236**
Rank 2	**1108**	**964**	**1008**	**924**
Rank 3	**903**	**903**	**1099**	**1099**

In most of the next descriptions, this table is represented compressed.
The ranks of codons bases are always classified in the same order: **A G T C**
A box is the total sum (protons number) of 4 coded with the identical 2 first DNA bases.



	A	G	T	C
A	300	296	192	320
G	300	160	128	376
T	144	256	320	288
C	256	192	224	252

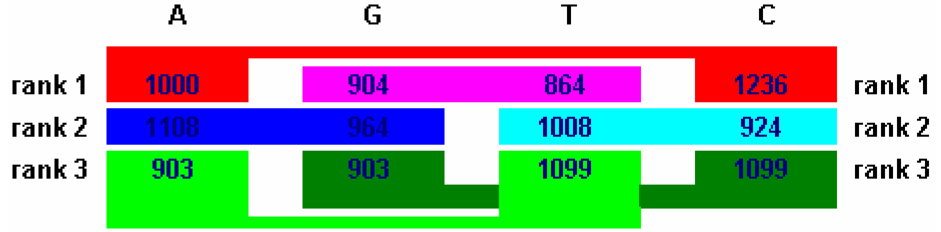
Phenomena of multiples (7 , 11 and 13) according to the rank of the base

The total number of protons of all the coded and **the excluded rebel group** is:

$$\mathbf{4004} = 2^2 \times \mathbf{7 \times 11 \times 13}$$

Of very numerous numeric phenomena of symmetric multiples of these last three prime numbers connect the structure of amino acids to the general configuration of the genetic code. The phenomena implying the prime number **7** are here most significant.

These values groups organize in multiples of prime numbers **13**, **7** and **11**



1000 + 1236 = 172 x 13 **904 + 864 = 136 x 13**	**1108 + 964 = 296 x 7** **1008 + 924 = 276 x 7**	**903 + 1099 = 182 x 11** **903 + 1099 = 182 x 11**

Rank by rank, all the sums of bases **A and G** and **T and C** are multiple of **7**

1000 + 904 = 272 x 7 **1108 + 964 = 296 x 7** **903 + 903 = 258 x 7**	**864 + 1236 = 300 x 7** **1008 + 924 = 276 x 7** **1099 + 1099 = 314 x 7**
Also, **50 %** of the individual values are multiple of **7**	The other 50 % are regularly multiple of **7** in 1 , in 2 and in 3 near
1008 =144 x 7 **924 = 132 x 7** **903 (base A) = 129 x 7** **903 (base G) = 129 x 7** **1099 (base T) = 157 x 7** **1099 (base C) = 157 x 7**	**1000 = (143 x 7) - 1** **904 = (129 x 7) + 1** **1108 = (157 x 7) + 2** **964 = (138 x 7) - 2** **864 = (123 x 7) + 3** **1236 = (177 x 7) - 3**

These values are not distributed at random but grouped together : the exact multiple values of 7 (in 0 near) concern the third whole rank (base A, G, T and C) and half of the second rank (base T and C).

Base rank	**Base A**	**Base G**	**Base T**	**Base C**
Rank 1	**1000 (- 1)***	**904 (+ 1)***	**864 (+ 3)***	**1236 (- 3)***
Rank 2	**1108 (+ 2)***	**964 (- 2)***	**1008**	**924**
Rank 3	**903**	**903**	**1099**	**1099**

***** multiple of 7 in 1 , in 2 and in 3 near

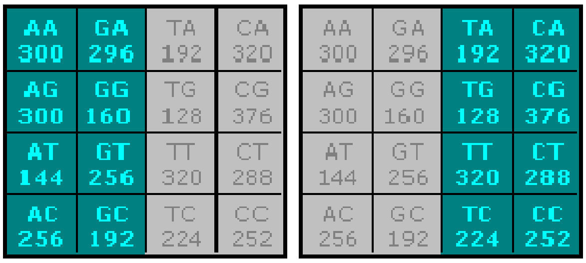
Condensed phenomena (summary) of these multiples of the prime number 7 :

Sums of

columns 1 + 2 **columns 3 + 4**

are multiples of **the prime number 7**

sum of columns 1 + 2 = 7 x 272



AA **300**	**GA** **296**	TA 192	CA 320
AG **300**	**GG** **160**	TG 128	CG 376
AT **144**	**GT** **256**	TT 320	CT 288
AC **256**	**GC** **192**	TC 224	CC 252

AA 300	GA 296	**TA** **192**	**CA** **320**
AG 300	GG 160	**TG** **128**	**CG** **376**
AT 144	GT 256	**TT** **320**	**CT** **288**
AC 256	GC 192	**TC** **224**	**CC** **252**

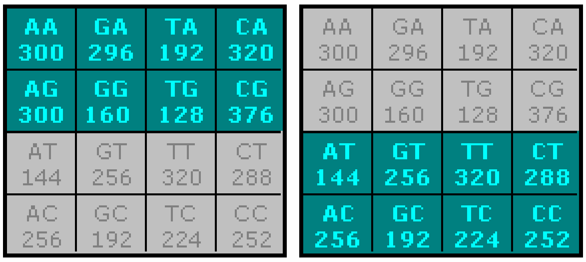
sum of columns 3 + 4 = 7 x 300

Sums of

lines 1 + 2 **lines 3 + 4**

are multiples of **the prime number 7**

sum of lines 1 + 2 = 7 x 296



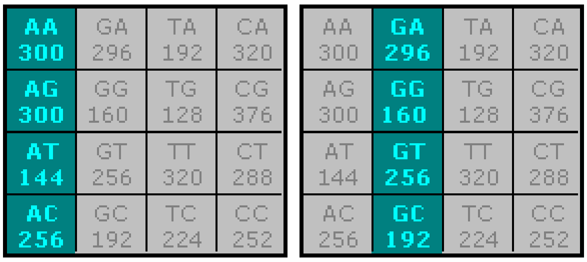
AA **300**	**GA** **296**	**TA** **192**	**CA** **320**
AG **300**	**GG** **160**	**TG** **128**	**CG** **376**
AT 144	GT 256	TT 320	CT 288
AC 256	GC 192	TC 224	CC 252

AA 300	GA 296	TA 192	CA 320
AG 300	GG 160	TG 128	CG 376
AT **144**	**GT** **256**	**TT** **320**	**CT** **288**
AC **256**	**GC** **192**	**TC** **224**	**CC** **252**

sum of lines 3 + 4 = 7 x 276

The sums of **individual columns** and **individual lines** are successively multiple of 7 (**in 0 near**), of 7 **in 1 near** , of 7 **in 2 near** and of 7 **in 3 near. All possibilities of 7 multiples are represented in the genetic code table: (8 possibilities in 4 lines and 4 columns).**

sum of column 1 = (7 x 143) - 1

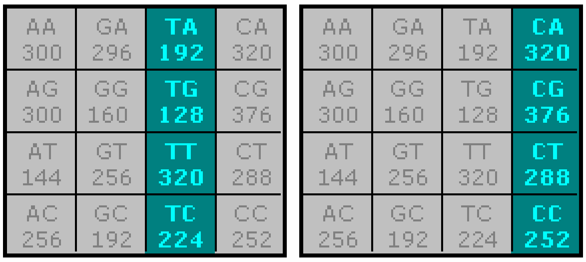


AA **300**	GA 296	TA 192	CA 320
AG **300**	GG 160	TG 128	CG 376
AT **144**	GT 256	TT 320	CT 288
AC **256**	GC 192	TC 224	CC 252

AA 300	**GA** **296**	TA 192	CA 320
AG 300	**GG** **160**	TG 128	CG 376
AT 144	**GT** **256**	TT 320	CT 288
AC 256	**GC** **192**	TC 224	CC 252

sum of column 2 = (7 x 129) + 1

sum of column 3 = (7 x 123) + 3

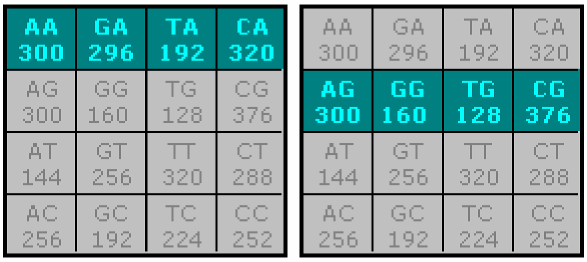


AA 300	GA 296	**TA** **192**	CA 320
AG 300	GG 160	**TG** **128**	CG 376
AT 144	GT 256	**TT** **320**	CT 288
AC 256	GC 192	**TC** **224**	CC 252

AA 300	GA 296	TA 192	**CA** **320**
AG 300	GG 160	TG 128	**CG** **376**
AT 144	GT 256	TT 320	**CT** **288**
AC 256	GC 192	TC 224	**CC** **252**

sum of column 4 = (7 x 177) - 3

sum of line 1 = (7 x 157) + 2

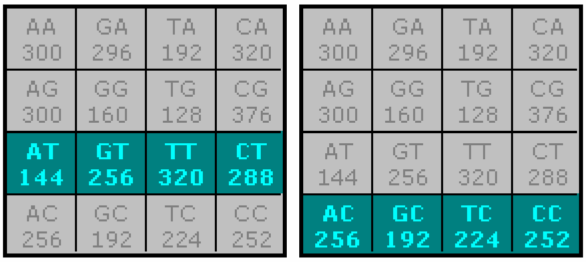


AA **300**	**GA** **296**	**TA** **192**	**CA** **320**
AG 300	GG 160	TG 128	CG 376
AT 144	GT 256	TT 320	CT 288
AC 256	GC 192	TC 224	CC 252

AA 300	GA 296	TA 192	CA 320
AG **300**	**GG** **160**	**TG** **128**	**CG** **376**
AT 144	GT 256	TT 320	CT 288
AC 256	GC 192	TC 224	CC 252

sum of line 2 = (7 x 138) - 2

sum of line 3 = (7 x 144) – 0



AA 300	GA 296	TA 192	CA 320
AG 300	GG 160	TG 128	CG 376
AT **144**	**GT** **256**	**TT** **320**	**CT** **288**
AC 256	GC 192	TC 224	CC 252

AA 300	GA 296	TA 192	CA 320
AG 300	GG 160	TG 128	CG 376
AT 144	GT 256	TT 320	CT 288
AC **256**	**GC** **192**	**TC** **224**	**CC** **252**

sum of line 4 = (7 x 132) + 0

Phenomena of concentration of prime number 7 multiples to the proline genetic coding

The total of the **16 values** (condensed by the main table of the genetic code) is multiple of the **prime number 7** (**4004 = 7 x 572**) and:

This total is subdivided in 2 groups also multiple of 7

8 values group multiple of 7:

300 + 296 + 192 + 320 +
300 + 160 + 128 + 376 =
2072 = 7 x 296

AA 300	GA 296	TA 192	CA 320
AG 300	GG 160	TG 128	CG 376

AT 144	GT 256	TT 320	CT 288
AC 256	GC 192	TC 224	CC 252

8 values group multiple of 7:

144 + 256 + 320 + 288 +
256 + 192 + 224 + 252 =
1932 = 7 x 256

and new division:

4 values group multiple of 7:

144 + 256 + 320 + 288 =
1008 = 7 x 144

AT 144	GT 256	TT 320	CT 288

AC 256	GC 192	TC 224	CC 252

4 values group multiple of 7:

256 + 192 + 224 + 252 =
924 = 7 x 132

and new division:

2 values group multiple of 7:

256 + 192 =

448 = 7 x 64

AC 256	GC 192

TC 224	CC 252

2 values group multiple of 7:

224 + 252 =

476 = 7 x 68

and new division:

1 value group multiple of 7:

224 =
7 x 32

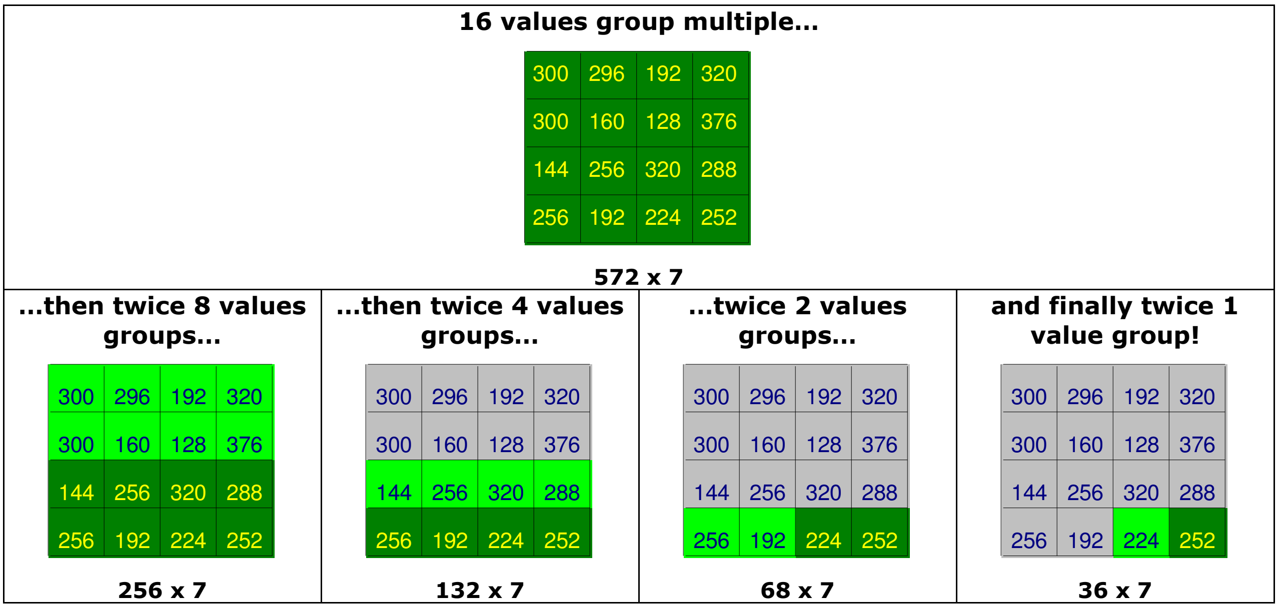
TC 224

CC 252

1 value group multiple of 7:

252 =
7 x 36

It appears so in this configuration of 7 multiples, a regular phenomenon of more and more strong concentration to the coding of **the proline:**



16 values group multiple...

300	296	192	320
300	160	128	376
144	256	320	288
256	192	224	252

572 x 7

...then twice 8 values groups...

300	296	192	320
300	160	128	376
144	256	320	288
256	192	224	252

256 x 7

...then twice 4 values groups...

300	296	192	320
300	160	128	376
144	256	320	288
256	192	224	252

132 x 7

...twice 2 values groups...

300	296	192	320
300	160	128	376
144	256	320	288
256	192	224	252

68 x 7

and finally twice 1 value group!

300	296	192	320
300	160	128	376
144	256	320	288
256	192	224	252

36 x 7

The probability of existence of this configuration in a square with 16 boxes (16 values) is **1/16307** **$(1/7^5)$**! This phenomenon concentrates to the coding of **the proline**, the amino acid the peculiarities of which described in introduction can not be without report with these observations.

➡ Curiously (but certainly not by chance), the box value coding for **the proline** (**252**) is the nearest value (among all 16 values) to the 16 values average : the 16 values average =

4004/16 = 250.25

The orderly last one of this table is the only one where, every time, four codons code for the same amino acid

ACA	**THR**	**64**	**GCA**	**ALA**	**48**	**TCA**	**SER**	**56**	**CCA**	**PRO**	**63**
ACG	THR	64	GCG	ALA	48	TCG	SER	56	CCG	PRO	63
ACT	THR	64	GCT	ALA	48	TCT	SER	56	CCT	PRO	63
ACC	THR	64	GCC	ALA	48	TCC	SER	56	CCC	PRO	63

Both basic values (**64 and 48**) left boxes (AC-and GC-) are multiple of **7** in one near. Both mutual values with right boxes (**56** and **63**) both are multiple exact of **7**.The more and more strong concentration of multiples of 7 towards these last two boxes of the table of the genetic code can so have a report with a stability of the coding of amino acids aiming towards four codons for one amino acid. This phenomenon concentrated on **the proline** to a direct report with another associated phenomenon:

VERY IMPORTANT ESTABLISHED PHENOMENA

The phenomenon of concentration of multiples of 7 to the proline coding has a link with the **number of coded** contained in every box (**first two identical bases**). At the top of the table, 8 boxes are necessary to form a multiple of 7 and 25 % of these boxes (2 boxes) code only for the coded only one. Then, on 4 boxes forming a multiple of 7 , 2 boxes (50 %) code for the coded only one. Both following boxes forming a multiple of 7 code in 100 % for the coded only one and it's the same for the 2 remaining boxes where concentrates this double phenomenon:

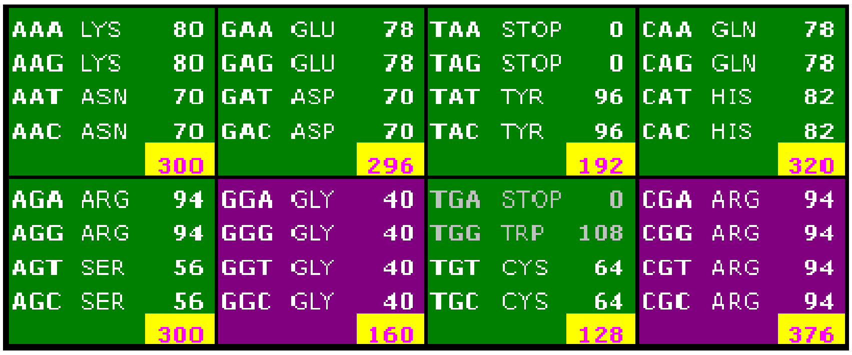
multiple of 7 and a single coded amino acid.

Associations "multiples of 7 and number of coded by box"

The phenomenon of concentration of multiple of 7 to the proline coding has a link with the **number of coded** contained in every box (**first two identical bases**):**(The rebel group is not booked.)**

Associations " multiples of 7 and number of coded by box

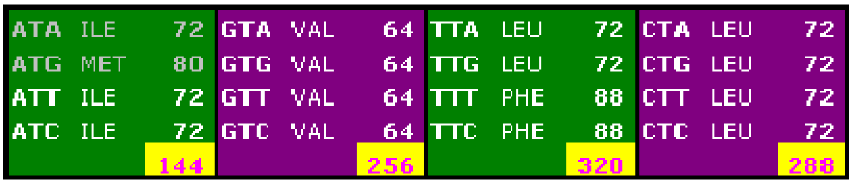
25 % boxes with 1 only coded



AAA	LYS	80	GAA	GLU	78	TAA	STOP	0	CAA	GLN	78
AAG	LYS	80	GAG	GLU	78	TAG	STOP	0	CAG	GLN	78
AAT	ASN	70	GAT	ASP	70	TAT	TYR	96	CAT	HIS	82
AAC	ASN	70	GAC	ASP	70	TAC	TYR	96	CAC	HIS	82
		300			296			192			320
AGA	ARG	94	GGA	GLY	40	TGA	STOP	0	CGA	ARG	94
AGG	ARG	94	GGG	GLY	40	TGG	TRP	108	CGG	ARG	94
AGT	SER	56	GGT	GLY	40	TGT	CYS	64	CGT	ARG	94
AGC	SER	56	GGC	GLY	40	TGC	CYS	64	CGC	ARG	94
		300			160			128			376

8 boxes for one 7 multiple

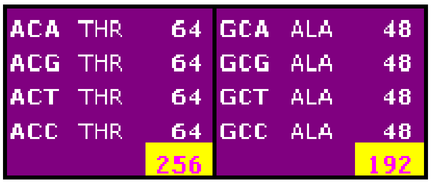
50 % boxes with 1 only coded



ATA	ILE	72	GTA	VAL	64	TTA	LEU	72	CTA	LEU	72
ATG	MET	80	GTG	VAL	64	TTG	LEU	72	CTG	LEU	72
ATT	ILE	72	GTT	VAL	64	TTT	PHE	88	CTT	LEU	72
ATC	ILE	72	GTC	VAL	64	TTC	PHE	88	CTC	LEU	72
		144			256			320			288

4 boxes for one 7 multiple

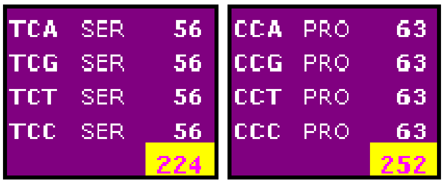
100 % boxes with 1 only coded



ACA	THR	64	GCA	ALA	48
ACG	THR	64	GCG	ALA	48
ACT	THR	64	GCT	ALA	48
ACC	THR	64	GCC	ALA	48
		256			192

2 boxes for one 7 multiple

100 % boxes with 1 only coded



TCA	SER	56	CCA	PRO	63
TCG	SER	56	CCG	PRO	63
TCT	SER	56	CCT	PRO	63
TCC	SER	56	CCC	PRO	63
		224			252

1 box for one 7 multiple

8 values to one 7 multiple and **25 %** boxes with **1 only coded**

300 + 296 + 192 + 320 + 300 + 160 + 128 + 376 = 2072 = 7 x 296

4 values to one 7 multiple and **50 %** boxes with **1 only coded**

144 + 256 + 320 + 288 = 1008 = 7 x 144

2 values to one 7 multiple and **100 %** boxes with **1 only coded**

256 + 192 = 448 = 7 x 64

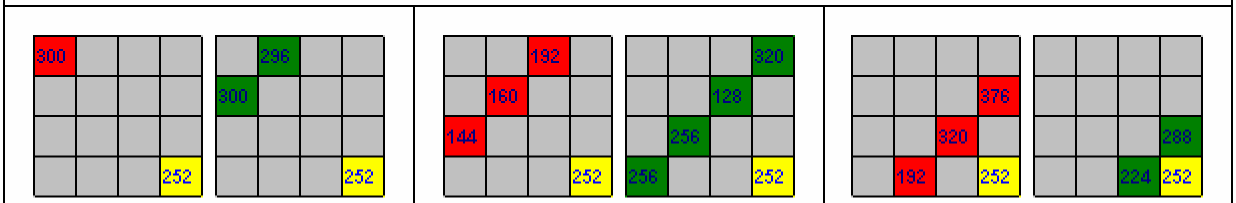
1 value to one 7 multiple and **100 %** boxes with **1 only coded**

224 = 7 x 32

252 = 7 x 36

Phenomena of diagonals associating to the proline genetic coding

The polarity (**+ 1** or **- 1** near) of these diagonals is regularly alternated

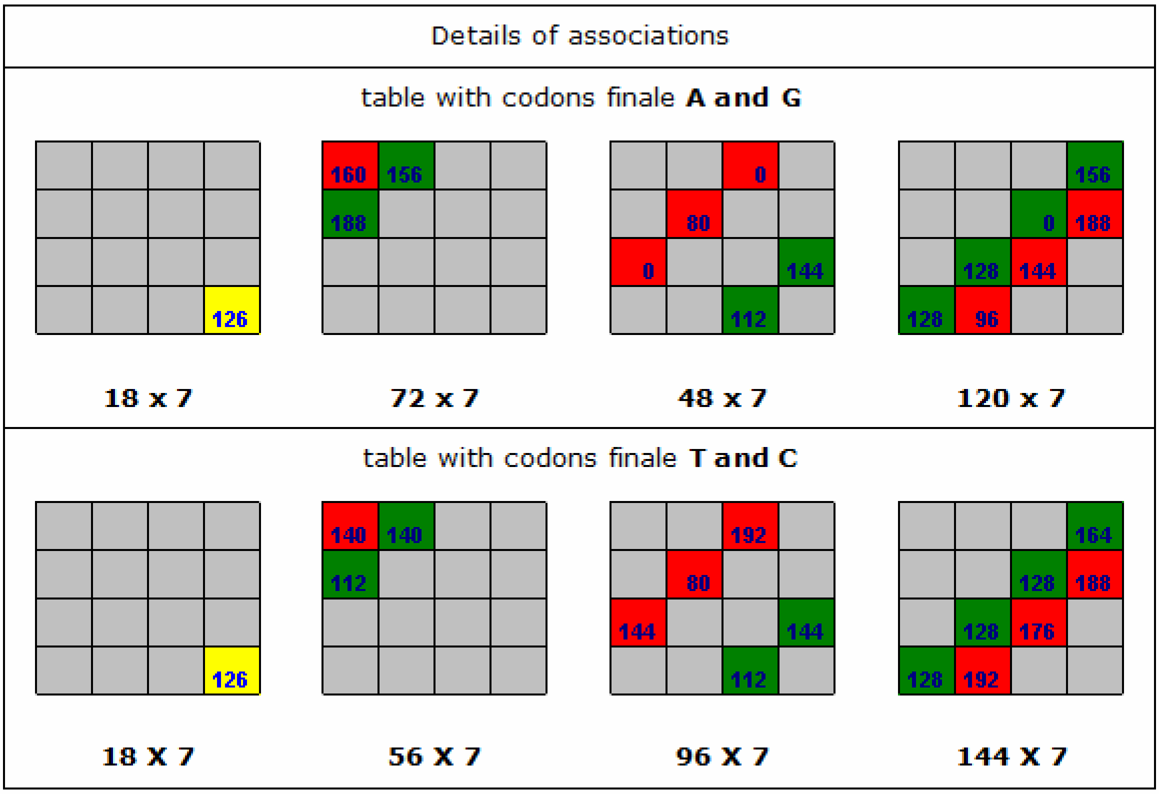


(43 x 7) – 1 (85 x 7) + 1 (71 x 7) – 1 (73 x 7) + 1 (127 x 7) - 1 (137 x 7) + 1

proline box = **36 x 7**

The total of every diagonal of the table of the genetic code since the first box (first and second base A) up to the last one (first and second base C) is always multiple of **7** in one near. Safe for this last box: **that coding for the proline**.

These diagonals join among them and form groups of 1 , 3 , 5 and 7 boxes the totals of which are multiple of **7**. The box of **the proline**, being already multiple of **7**, remains alone and can not moreover join with the other diagonals (odd number of diagonals). By separating the boxes values among the coded codons of which have finales **A and G** and those codons of which have finales **T and C**, the phenomena of multiples of **7** are protected. This, although the values (and the coded) are different in both sub-tables.



Details of associations

table with codons finale **A and G**

			126

18 x 7

160	156		
188			

72 x 7

		0	
	80		
0			144
		112	

48 x 7

			156
		0	188
	128	144	
128	96		

120 x 7

table with codons finale **T and C**

			126

18 X 7

140	140		
112			

56 X 7

		192	
	80		
144			144
		112	

96 X 7

			164
		128	188
	128	176	
128	192		

144 X 7

<u>Phenomena of multiples of the prime number 11 associated to the number of coded by box</u>

Here, phenomena implicate the prime number 11 are most significant.

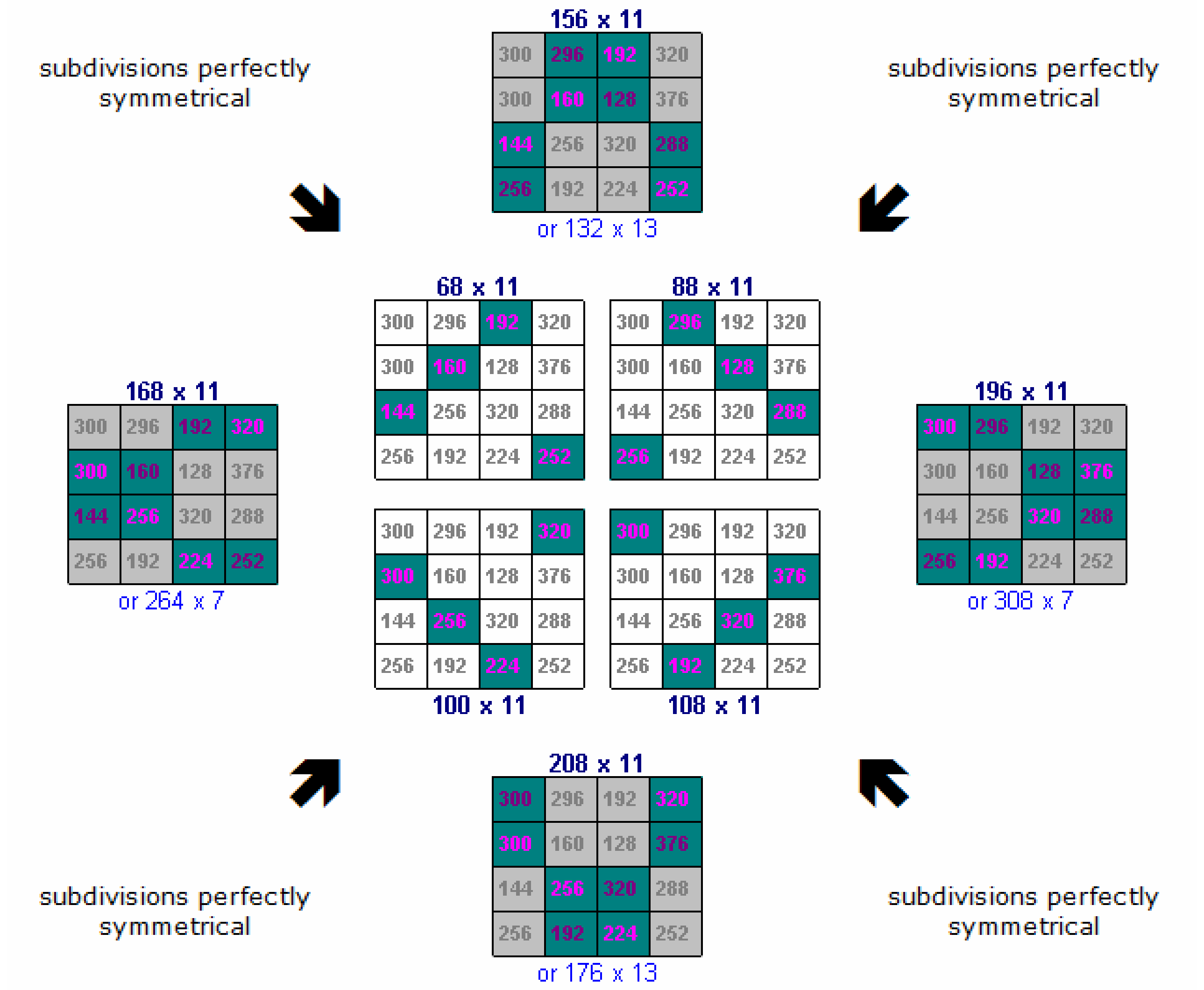
The sums of 8 values of 4 symmetric groups are **multiple of 11**.

The sums of 8 values of 2 symmetric groups are **multiple of 11 and multiple of 7.**

The sums of 8 values of the 2 symmetric other groups are **multiple of 11 and multiple of 13**.

Inside these symmetric groups of 8 values and multiple of **11**, others subgroups of 4 perfectly symmetric and additional values are also multiple of **11**.

Perfectly symmetric subgroups of 11 multiples



156 x 11

300	296	192	320
300	160	128	376
144	256	320	288
256	192	224	252

or 132 x 13

68 x 11

300	296	192	320
300	160	128	376
144	256	320	288
256	192	224	252

88 x 11

300	296	192	320
300	160	128	376
144	256	320	288
256	192	224	252

168 x 11

300	296	192	320
300	160	128	376
144	256	320	288
256	192	224	252

or 264 x 7

196 x 11

300	296	192	320
300	160	128	376
144	256	320	288
256	192	224	252

or 308 x 7

300	296	192	320
300	160	128	376
144	256	320	288
256	192	224	252

100 x 11

300	296	192	320
300	160	128	376
144	256	320	288
256	192	224	252

108 x 11

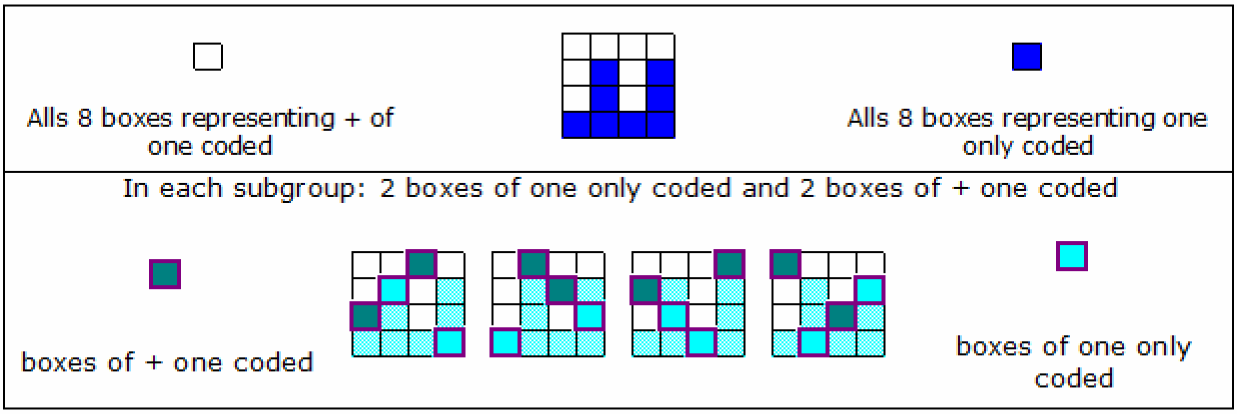
208 x 11

300	296	192	320
300	160	128	376
144	256	320	288
256	192	224	252

or 176 x 13

It is not possible that these phenomena are to be by chance. These phenomena are connected to the number of coded by box (codons with the two first DNA bases identical).

Associations of these phenomena of symmetric multiples of the prime number 11 with the number of coded by box : Curious phenomenon, in each subgroup of 4 values (4 boxes) systematically, 2 boxes represent one only coded.



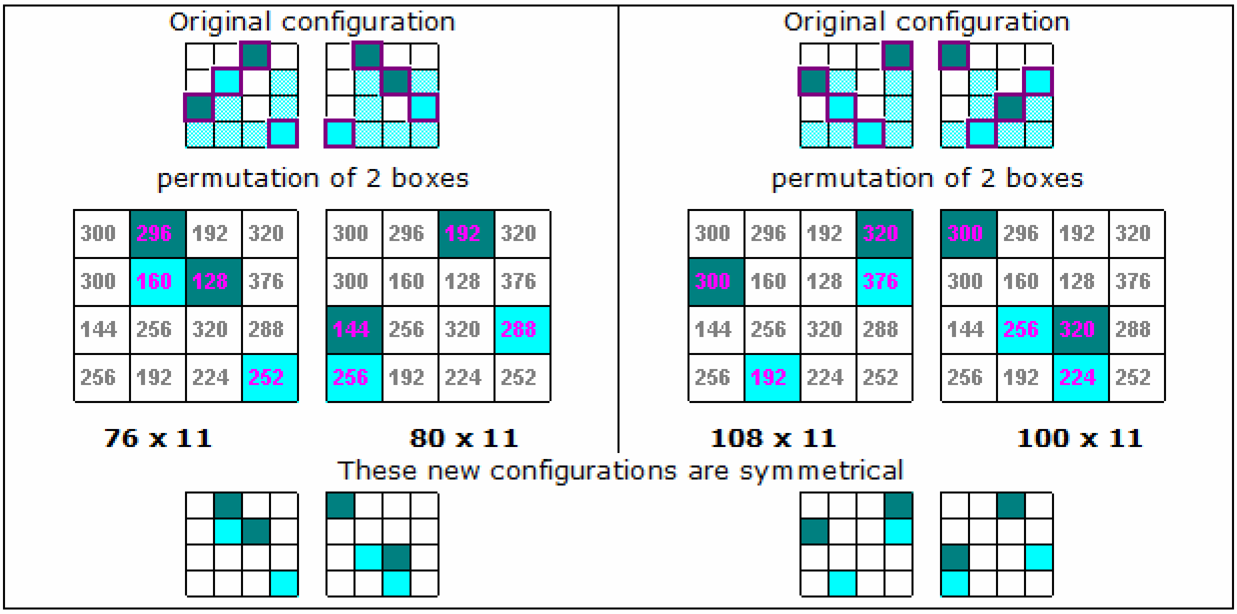
Superposition of the two configurations

The configuration with boxes representing one only coded is not symmetrical but the superposition with the symmetrical sub groups of 11 multiples form regularly associations of 4 boxes with 2 boxes representing + of one coded and 2 boxes representing one only coded!

300	296	192	320
300	160	128	376
144	256	320	288
256	192	224	252

In each sub group: 2 boxes of one only coded and 2 boxes of + one coded

By permuting two by two, into each sub group, 2 boxes of one only coded and 2 boxes of + one coded, appears new configurations also multiple of 11.



Original configuration

permutation of 2 boxes

300	296	192	320
300	160	128	376
144	256	320	288
256	192	224	252

76 x 11

300	296	192	320
300	160	128	376
144	256	320	288
256	192	224	252

80 x 11

Original configuration

permutation of 2 boxes

300	296	192	320
300	160	128	376
144	256	320	288
256	192	224	252

108 x 11

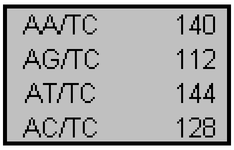
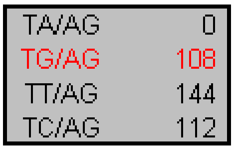
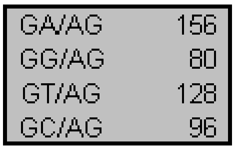
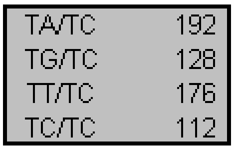
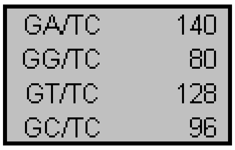
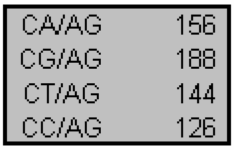
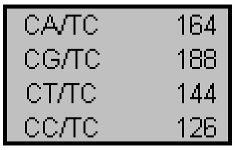
300	296	192	320
300	160	128	376
144	256	320	288
256	192	224	252

100 x 11

These new configurations are symmetrical

Others phenomena of multiples of prime numbers 7, 11 and 13

In the following configuration, associations of multiples of prime numbers **13**, **11** and **7** are progressive from 7 to 13. **Here, the boxes values stand apart between codons by final AG and codons by final TC.**

Symmetric and progressive associations of multiples of prime numbers **13**, **11** and **7**		
AA/TC 140 AG/TC 112 AT/TC 144 AC/TC 128 **524**	AA/AG 160 AG/AG 188 AT/AG 152 AC/AG 128 **476**	**1000** **= (77 x 13)** – 1
TA/AG 0 TG/AG 108 TT/AG 144 TC/AG 112 **256**	GA/AG 156 GG/AG 80 GT/AG 128 GC/AG 96 **460**	**716** **= (55 x 13)** + 1
780 **= 60 x 13** (71x11)–1 or (111x7)+3	**936** **= 72 x 13** (85x11)+1 or (134x7)-2	**1716** **=132 x 13 or 156 x 11** **or (245 x 7) + 1**
TA/TC 192 TG/TC 128 TT/TC 176 TC/TC 112 **608**	GA/TC 140 GG/TC 80 GT/TC 128 GC/TC 96 **444**	**1052** **= (81 x 13)** – 1
CA/AG 156 CG/AG 188 CT/AG 144 CC/AG 126 **614**	CA/TC 164 CG/TC 188 CT/TC 144 CC/TC 126 **622**	**1236** **= (95 x 13)** + 1
1222 **= 94 x 13** (111x11)+1 or (175x7)-3	**1066** **= 82 x 13** (97x 11)-1 or (152x7)+2	**2288** **= 176 x 13 or 208 x 11** **or (327 x 7) - 1**
2002 **= 2 x 13 x 11 x 7**	**2002** **= 2 x 13 x 11 x 7**	**4004** **= 4 x 13 x 11 x 7**

In this configuration, the total sum **4004** is multiple of prime numbers **13**, **11** and **7**. The subtotal sums **1716** and **2288** are multiple of **13** and **11** and multiple of **7 in 1 near**.

The subtotal sums **936** and **1066** are multiple of **13,** multiple of **11 in 1 near** and multiple of **7 in 2 near.**

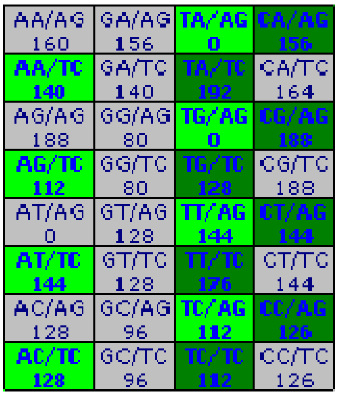
The subtotal sums **780** and **1222** are multiple of **13,** multiple of **11 in 1 near** and multiple of **7 in 3 near.**

The two sums **2002** (multiple of 13, 11 and 7) are identical but represent not identical coded!
Phenomena presentation in the genetic code table:

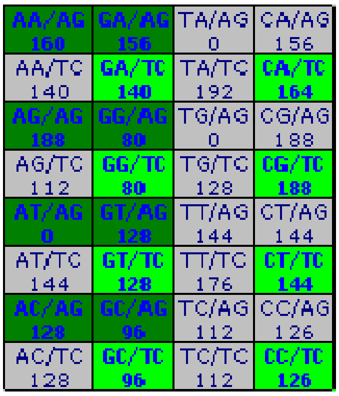
Configurations multiple of 13, 11 and 7

2002 = 2 x 7 x 11 x 13 | **2002 = 2 x 7 x 11 x 13**

Identical sums but not identical coded !



AA/AG 160	GA/AG 156	**TA/AG 0**	**CA/AG 156**
AA/TC 140	GA/TC 140	**TA/TC 192**	CA/TC 164
AG/AG 188	GG/AG 80	**TG/AG 0**	**CG/AG 188**
AG/TC 112	GG/TC 80	**TG/TC 128**	CG/TC 188
AT/AG 0	GT/AG 128	**TT/AG 144**	**CT/AG 144**
AT/TC 144	GT/TC 128	**TT/TC 176**	CT/TC 144
AC/AG 128	GC/AG 96	**TC/AG 112**	**CC/AG 126**
AC/TC 128	GC/TC 96	**TC/TC 112**	CC/TC 126



AA/AG 160	**GA/AG 156**	TA/AG 0	CA/AG 156
AA/TC 140	**GA/TC 140**	TA/TC 192	**CA/TC 164**
AG/AG 188	**GG/AG 80**	TG/AG 0	CG/AG 188
AG/TC 112	**GG/TC 80**	TG/TC 128	**CG/TC 188**
AT/AG 0	**GT/AG 128**	TT/AG 144	CT/AG 144
AT/TC 144	**GT/TC 128**	TT/TC 176	**CT/TC 144**
AC/AG 128	**GC/AG 96**	TC/AG 112	CC/AG 126
AC/TC 128	**GC/TC 96**	TC/TC 112	**CC/TC 126**

780	**1222**	**936**	**1066**
= 60 x 13	**= 94 x 13**	**= 72 x 13**	**= 82 x 13**
(71x11)–1 (111x7)+3	(111x11)+1 (175x7)-3	(85x11)+1 (134x7)-2	(97x11)–1 (152x7)+2

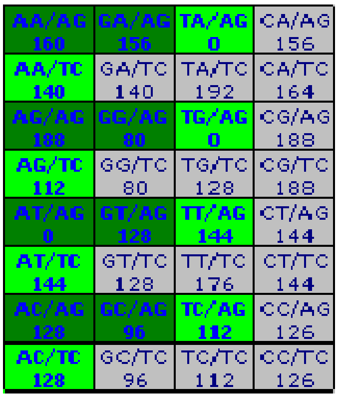
Configurations multiple of 13 and 11 (and 7 in 1 near)

1716 =

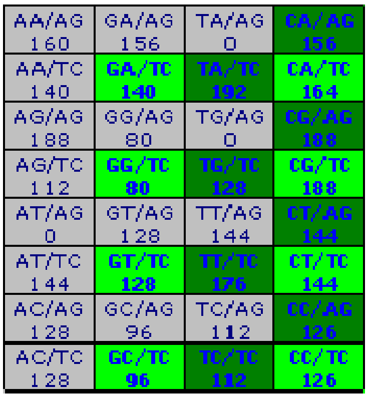
132 x 13 or 156 x 11
or (245 x 7) + 1

2288 =

= 176 x 13 or 208 x 11
or (327 x 7) – 1



AA/AG 160	**GA/AG 156**	**TA/AG 0**	CA/AG 156
AA/TC 140	GA/TC 140	TA/TC 192	CA/TC 164
AG/AG 188	**GG/AG 80**	**TG/AG 0**	CG/AG 188
AG/TC 112	GG/TC 80	TG/TC 128	CG/TC 188
AT/AG 0	**GT/AG 128**	**TT/AG 144**	CT/AG 144
AT/TC 144	GT/TC 128	TT/TC 176	CT/TC 144
AC/AG 128	**GC/AG 96**	**TC/AG 112**	CC/AG 126
AC/TC 128	GC/TC 96	TC/TC 112	CC/TC 126



AA/AG 160	GA/AG 156	TA/AG 0	**CA/AG 156**
AA/TC 140	**GA/TC 140**	**TA/TC 192**	**CA/TC 164**
AG/AG 188	GG/AG 80	TG/AG 0	**CG/AG 188**
AG/TC 112	**GG/TC 80**	**TG/TC 128**	**CG/TC 188**
AT/AG 0	GT/AG 128	TT/AG 144	**CT/AG 144**
AT/TC 144	**GT/TC 128**	**TT/TC 176**	**CT/TC 144**
AC/AG 128	GC/AG 96	TC/AG 112	**CC/AG 126**
AC/TC 128	**GC/TC 96**	**TC/TC 112**	**CC/TC 126**

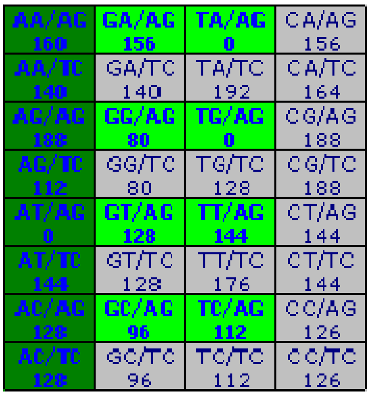
These previous configurations of multiples of prime number 13 implicate numerous others configurations of symmetric multiples with symmetric sub configurations systematically multiple of 13 in 1 near !

These phenomena presented here shows all the philosophy emanating of this study on the genetic code: very large and subtle sophistication of fitting of numerical phenomena connecting codons with the coded.

In order to not complicate the presentation of the phenomena too much, only some configurations are presented here.

Some configurations of symmetric 13 multiples with symmetric sub configurations systematically multiple of 13 in 1 near:

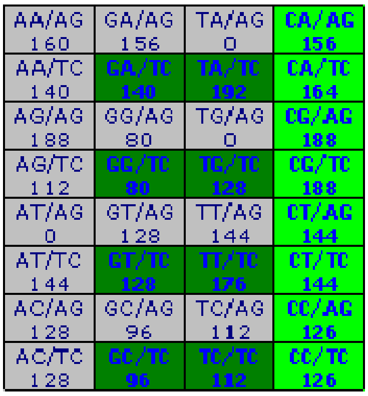
1716 = 132 x 13



AA/AG 160	GA/AG 156	TA/AG 0	CA/AG 156
AA/TC 140	GA/TC 140	TA/TC 192	CA/TC 164
AG/AG 188	GG/AG 80	TG/AG 0	CG/AG 188
AG/TC 112	GG/TC 80	TG/TC 128	CG/TC 188
AT/AG 0	GT/AG 128	TT/AG 144	CT/AG 144
AT/TC 144	GT/TC 128	TT/TC 176	CT/TC 144
AC/AG 128	GC/AG 96	TC/AG 112	CC/AG 126
AC/TC 128	GC/TC 96	TC/TC 112	CC/TC 126

716 = 55 x 13 + 1 **1000 = 77 x 13 - 1**

2288 = 176 x 13

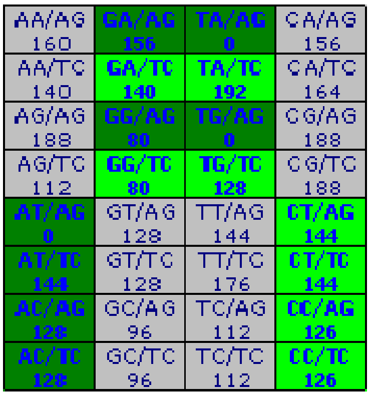


AA/AG 160	GA/AG 156	TA/AG 0	CA/AG 156
AA/TC 140	GA/TC 140	TA/TC 192	CA/TC 164
AG/AG 188	GG/AG 80	TG/AG 0	CG/AG 188
AG/TC 112	GG/TC 80	TG/TC 128	CG/TC 188
AT/AG 0	GT/AG 128	TT/AG 144	CT/AG 144
AT/TC 144	GT/TC 128	TT/TC 176	CT/TC 144
AC/AG 128	GC/AG 96	TC/AG 112	CC/AG 126
AC/TC 128	GC/TC 96	TC/TC 112	CC/TC 126

1236 = 95 x 13 + 1 **1052 = 81 x 13 - 1**

configurations different but even total sums:

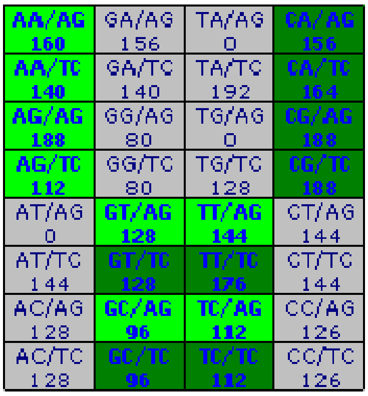
1716 = 132 x 13



AA/AG 160	GA/AG 156	TA/AG 0	CA/AG 156
AA/TC 140	GA/TC 140	TA/TC 192	CA/TC 164
AG/AG 188	GG/AG 80	TG/AG 0	CG/AG 188
AG/TC 112	GG/TC 80	TG/TC 128	CG/TC 188
AT/AG 0	GT/AG 128	TT/AG 144	CT/AG 144
AT/TC 144	GT/TC 128	TT/TC 176	CT/TC 144
AC/AG 128	GC/AG 96	TC/AG 112	CC/AG 126
AC/TC 128	GC/TC 96	TC/TC 112	CC/TC 126

636 = 49 x 13 - 1 **1080 = 83 x 13 + 1**

2288 = 176 x 13

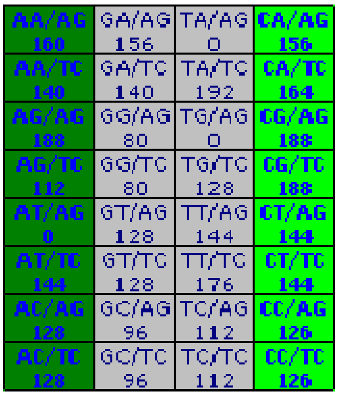


AA/AG 160	GA/AG 156	TA/AG 0	CA/AG 156
AA/TC 140	GA/TC 140	TA/TC 192	CA/TC 164
AG/AG 188	GG/AG 80	TG/AG 0	CG/AG 188
AG/TC 112	GG/TC 80	TG/TC 128	CG/TC 188
AT/AG 0	GT/AG 128	TT/AG 144	CT/AG 144
AT/TC 144	GT/TC 128	TT/TC 176	CT/TC 144
AC/AG 128	GC/AG 96	TC/AG 112	CC/AG 126
AC/TC 128	GC/TC 96	TC/TC 112	CC/TC 126

1080 = 83 x 13 + 1 **1208 = 93 x 13 - 1**

Others subtle configurations:

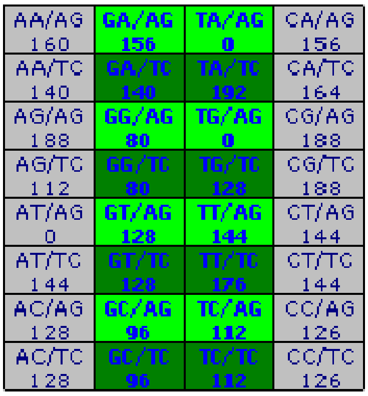
2236 = 172 x 13



AA/AG 160	GA/AG 156	TA/AG 0	CA/AG 156
AA/TC 140	GA/TC 140	TA/TC 192	CA/TC 164
AG/AG 188	GG/AG 80	TG/AG 0	CG/AG 188
AG/TC 112	GG/TC 80	TG/TC 128	CG/TC 188
AT/AG 0	GT/AG 128	TT/AG 144	CT/AG 144
AT/TC 144	GT/TC 128	TT/TC 176	CT/TC 144
AC/AG 128	GC/AG 96	TC/AG 112	CC/AG 126
AC/TC 128	GC/TC 96	TC/TC 112	CC/TC 126

1000 = 77 x 13 - 1 **1236 = 95 x 13 + 1**

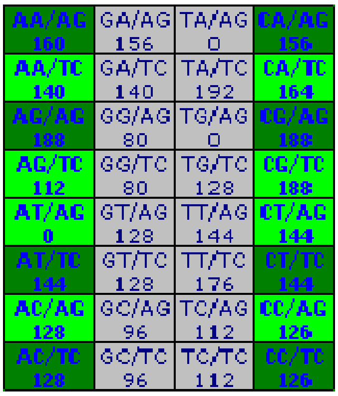
1768 = 136 x 13



AA/AG 160	GA/AG 156	TA/AG 0	CA/AG 156
AA/TC 140	GA/TC 140	TA/TC 192	CA/TC 164
AG/AG 188	GG/AG 80	TG/AG 0	CG/AG 188
AG/TC 112	GG/TC 80	TG/TC 128	CG/TC 188
AT/AG 0	GT/AG 128	TT/AG 144	CT/AG 144
AT/TC 144	GT/TC 128	TT/TC 176	CT/TC 144
AC/AG 128	GC/AG 96	TC/AG 112	CC/AG 126
AC/TC 128	GC/TC 96	TC/TC 112	CC/TC 126

716 = 55 x 13 + 1 **1052 = 81 x 13 - 1**

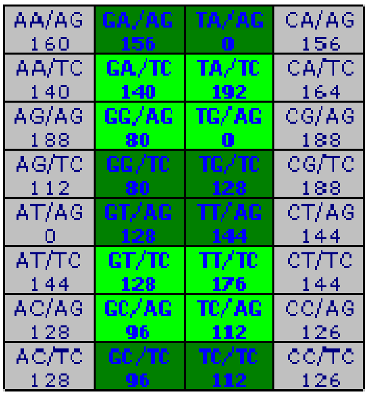
2236 = 172 x 13



AA/AG 160	GA/AG 156	TA/AG 0	CA/AG 156
AA/TC 140	GA/TC 140	TA/TC 192	CA/TC 164
AG/AG 188	GG/AG 80	TG/AG 0	CG/AG 188
AG/TC 112	GG/TC 80	TG/TC 128	CG/TC 188
AT/AG 0	GT/AG 128	TT/AG 144	CT/AG 144
AT/TC 144	GT/TC 128	TT/TC 176	CT/TC 144
AC/AG 128	GC/AG 96	TC/AG 112	CC/AG 126
AC/TC 128	GC/TC 96	TC/TC 112	CC/TC 126

1234 = 95 x 13 - 1 1002 = 77 x 13 + 1

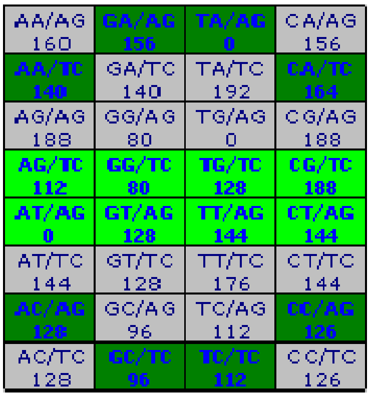
1768 = 136 x 13



AA/AG 160	GA/AG 156	TA/AG 0	CA/AG 156
AA/TC 140	GA/TC 140	TA/TC 192	CA/TC 164
AG/AG 188	GG/AG 80	TG/AG 0	CG/AG 188
AG/TC 112	GG/TC 80	TG/TC 128	CG/TC 188
AT/AG 0	GT/AG 128	TT/AG 144	CT/AG 144
AT/TC 144	GT/TC 128	TT/TC 176	CT/TC 144
AC/AG 128	GC/AG 96	TC/AG 112	CC/AG 126
AC/TC 128	GC/TC 96	TC/TC 112	CC/TC 126

924 = 71 x 13 + 1 844 = 65 x 13 - 1

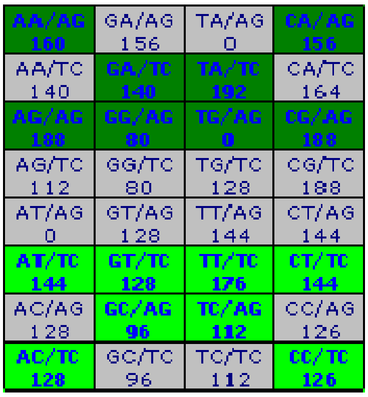
1846 = 142 x 13



AA/AG 160	GA/AG 156	TA/AG 0	CA/AG 156
AA/TC 140	GA/TC 140	TA/TC 192	CA/TC 164
AG/AG 188	GG/AG 80	TG/AG 0	CG/AG 188
AG/TC 112	GG/TC 80	TG/TC 128	CG/TC 188
AT/AG 0	GT/AG 128	TT/AG 144	CT/AG 144
AT/TC 144	GT/TC 128	TT/TC 176	CT/TC 144
AC/AG 128	GC/AG 96	TC/AG 112	CC/AG 126
AC/TC 128	GC/TC 96	TC/TC 112	CC/TC 126

922 = 71 x 13 - 1 924 = 71 x 13 + 1

2158 = 166 x 13



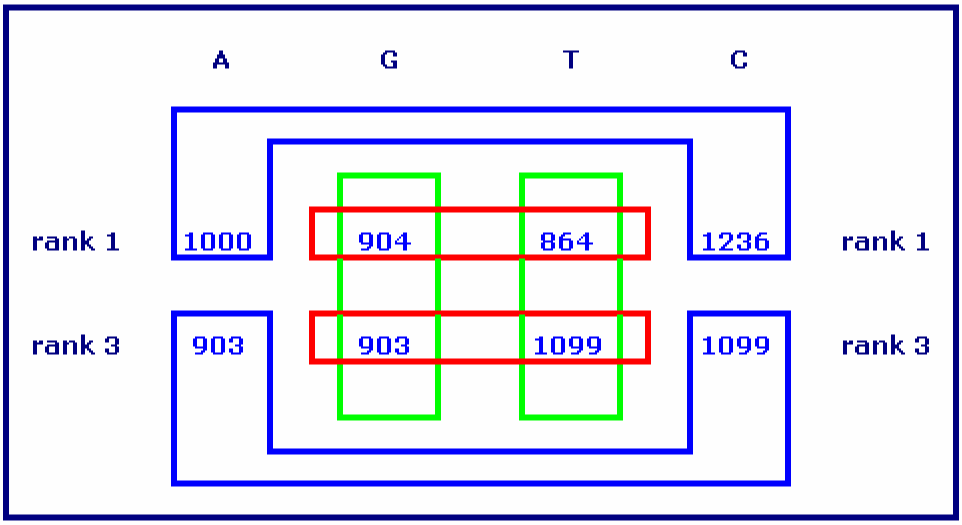
AA/AG 160	GA/AG 156	TA/AG 0	CA/AG 156
AA/TC 140	GA/TC 140	TA/TC 192	CA/TC 164
AG/AG 188	GG/AG 80	TG/AG 0	CG/AG 188
AG/TC 112	GG/TC 80	TG/TC 128	CG/TC 188
AT/AG 0	GT/AG 128	TT/AG 144	CT/AG 144
AT/TC 144	GT/TC 128	TT/TC 176	CT/TC 144
AC/AG 128	GC/AG 96	TC/AG 112	CC/AG 126
AC/TC 128	GC/TC 96	TC/TC 112	CC/TC 126

1054 = 81 x 13 + 1 1104 = 85 x 13 - 1

Others phenomena of only multiples of prime number 13

Symmetric associations of multiples of prime number 13

(no associations with rank 2)



1000 + 1236 = 172 x13	**904 + 864 = 136 x13**	**904 + 903 = 139 x13**
903 + 1099 = 154 x 13	**903 + 1099 = 154 x13**	**864 + 1099 = 151 x 13**

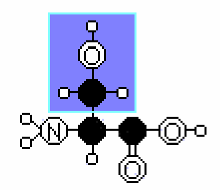
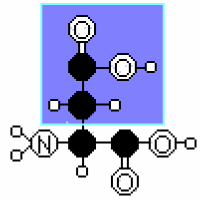
Various important observed phenomena	
The base of twenty amino acids is always the same : consisted of 4 atoms of hydrogen, 2 atoms of carbon, 1 atom of nitrogen, and 2 atoms of oxygen.	**The total protons number of every base (of amino acid) is** **39 ➡ 3 times prime number 13**
Systematically, it seems that the coded are identical if the final base of the codon is **A** either **G** or if this base is **T** or **C**. This except for a named group ***the rebel group*** : ATA72, ATG80, TGG108 and TGA (STOP)	**The total protons number of the rebel group is** **260 ➡ 20 times prime number 13**
Three coded amino acids contain **a sulphur atom**, this **sulphured coded group is**: TGT64, TGC64 and ATG80 (cysteine, cysteine and methionine).	**The total protons number of the sulphured group is** **208 ➡ 16 times prime number 13**

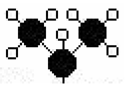
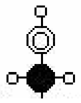
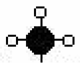
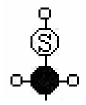
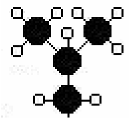
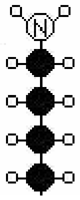
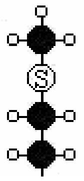
Symmetric and not symmetric amino acids

Here are connected by numeric and symmetric phenomena of multiples of the prime numbers 7, 11 and 13:

- **the configuration of DNA bases,**
- **the number of protons contained in every respective amino acid**
- **and the molecular structure of the respective amino acid.**

The 20 amino acids used in the genetic code can be distributed in two groups. These two groups separate the amino acids with a **symmetric radical** (including the electronic liaisons) from those with a **asymmetric radical**.

Examples of configurations	
SER 56  with a symmetric radical with a protons number multiple of 8	ASP 70  with a asymmetric radical with a protons number not multiple of 8

The 8 amino acids with a **symmetric radical**			
 **VAL 64**	 **SER 56**	 **ALA 48**	 **GLY 40**
 **CYS 64**	 **LEU 72**	 **LYS 80**	 **MET 80**

Without the rebel group, the interaction between the group of amino acids with symmetric radical and this with not symmetric radical reveals numerical phenomena of symmetric multiples of the prime numbers **7**, **11** and **13**.

Distribution of protons numbers in the genetic code table (without the rebel group)

AA with symmetric radical **AA with not symmetric radical**

AAA 80 LYS AAG 80 LYS AAT 70 ASN AAC 70 ASN **160** **140**	GAA 78 GLU GAG 78 GLU GAT 70 ASP GAC 70 ASP **0** **296**	TAA 0 TAG 0 TAT 96 TYR TAC 96 TYR **0** **192**	CAA 78 GLN CAG 78 GLN CAT 82 HIS CAC 82 HIS **0** **320**
AGA 94 ARG AGG 94 ARG AGT 56 SER AGC 56 SER **112** **188**	GGA 40 GLY GGG 40 GLY GGT 40 GLY GGC 40 GLY **160** **0**	TGA 0 TGG 108 TRP TGT 64 CYS TGC 64 CYS **128** **0**	CGA 94 ARG CGG 94 ARG CGT 94 ARG CGC 94 ARG **0** **376**
ATA 72 ILE ATG 80 MET ATT 72 ILE ATC 72 ILE **0** **144**	GTA 64 VAL GTG 64 VAL GTT 64 VAL GTC 64 VAL **256** **0**	TTA 72 LEU TTG 72 LEU TTT 88 PHE TTC 88 PHE **144** **176**	CTA 72 LEU CTG 72 LEU CTT 72 LEU CTC 72 LEU **288** **0**
ACA 64 THR ACG 64 THR ACT 64 THR ACC 64 THR **0** **256**	GCA 48 ALA GCG 48 ALA GCT 48 ALA GCC 48 ALA **192** **0**	TCA 56 SER TCG 56 SER TCT 56 SER TCC 56 SER **224** **0**	CCA 63 PRO CCG 63 PRO CCT 63 PRO CCC 63 PRO **0** **252**

1664 = **13** x 4 x 32

2340 = **13** x 4 x 45

The protons numbers of these two groups are multiple of the prime number 13 :
(recall: the total number of the 64 coded is 4004 = 308 x 13)

Distribution of protons numbers in the genetic code table (without the rebel group)

AA with symmetric radical

	A	T	G	C
A	160			
T	112	160	128	
G		256	144	288
C		192	224	

1664 = **13** x 4 x 32

AA with not symmetric radical

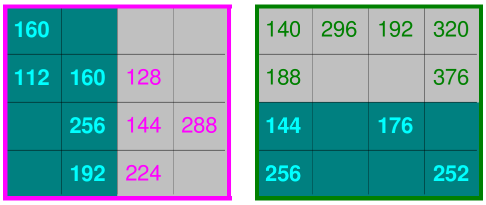
	A	T	G	C
A	140	296	192	320
T	188			376
G	144		176	
C	256			252

2340 = **13** x 4 x 45

Phenomena of symmetric multiples of the prime numbers **7**, **11** and **13**:

Numeric symmetrical phenomena of multiples of the prime number 7

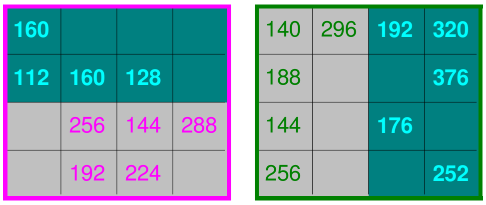
(recall: AA with symmetric radical AA with not symmetric radical)



160			
112	**160**	128	
	256	144	288
	192	224	

140	296	192	320
188			376
144		**176**	
256			**252**

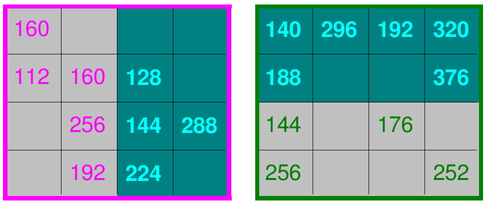
1708 = **7** x 4 x 61



160			
112	**160**	**128**	
	256	144	288
	192	224	

140	296	**192**	**320**
188			**376**
144		**176**	
256			**252**

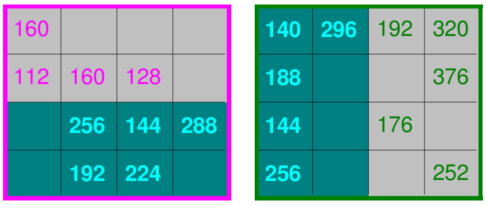
1876 = **7** x 4 x 67



160			
112	160	**128**	
	256	**144**	**288**
	192	**224**	

140	**296**	**192**	**320**
188			**376**
144		176	
256			252

2296 = **7** x 4 x 82

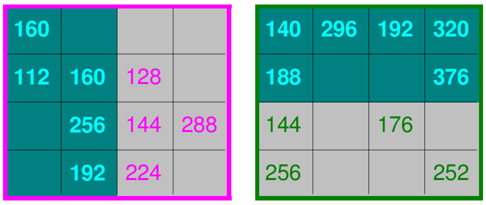


160			
112	160	128	
	256	**144**	**288**
	192	**224**	

140	**296**	192	320
188			376
144		176	
256			252

2128 = **7** x 4 x 76

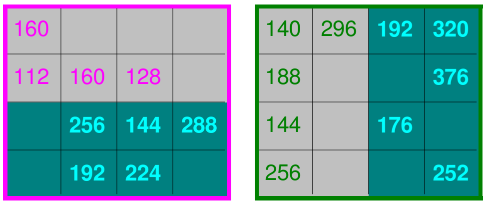
Numeric symmetrical phenomena of multiples of prime numbers 11 and 13



160			
112	**160**	128	
	256	144	288
	192	224	

140	**296**	**192**	**320**
188			**376**
144		176	
256			252

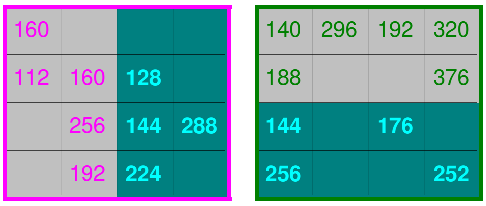
2392 = **13** x 4 x 46



160			
112	160	128	
	256	**144**	**288**
	192	**224**	

140	296	**192**	**320**
188			**376**
144		**176**	
256			**252**

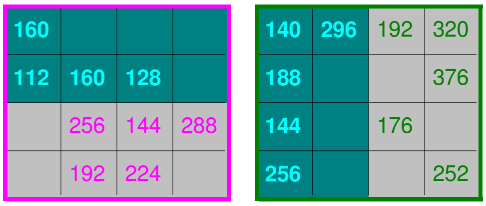
2420 = **11** x 4 x 55



160			
112	160	**128**	
	256	**144**	**288**
	192	**224**	

140	296	192	320
188			376
144		**176**	
256			**252**

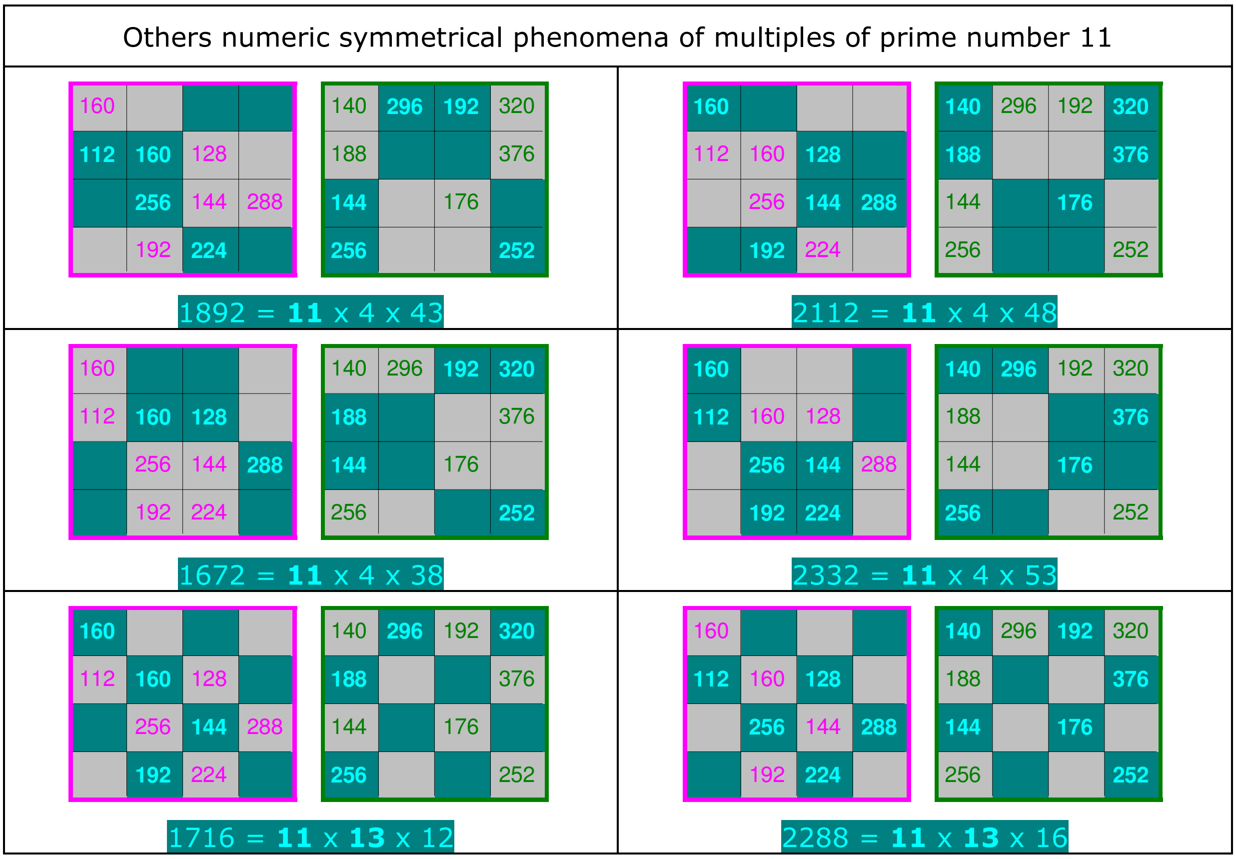
1612 = **13** x 4 x 31



160			
112	**160**	**128**	
	256	144	288
	192	224	

140	**296**	192	320
188			376
144		176	
256			252

1584 = **11** x 4 x 36



Others numeric symmetrical phenomena of multiples of prime number 11

160				140	**296**	**192**	320
112	**160**	128		188			376
	256	144	288	**144**		176	
	192	**224**		**256**			**252**

1892 = **11** x 4 x 43

160				**140**	296	192	**320**
112	160	**128**		**188**			**376**
	256	**144**	**288**	144		**176**	
	192	224		256			252

2112 = **11** x 4 x 48

160				140	296	**192**	**320**
112	**160**	**128**		**188**			376
	256	144	**288**	**144**		176	
	192	224		256			**252**

1672 = **11** x 4 x 38

160				**140**	**296**	192	320
112	160	128		188			**376**
	256	**144**	288	144		**176**	
	192	**224**		**256**			252

2332 = **11** x 4 x 53

160				140	**296**	192	**320**
112	**160**	128		**188**			376
	256	**144**	288	144		176	
	192	224		**256**			252

1716 = **11** x **13** x 12

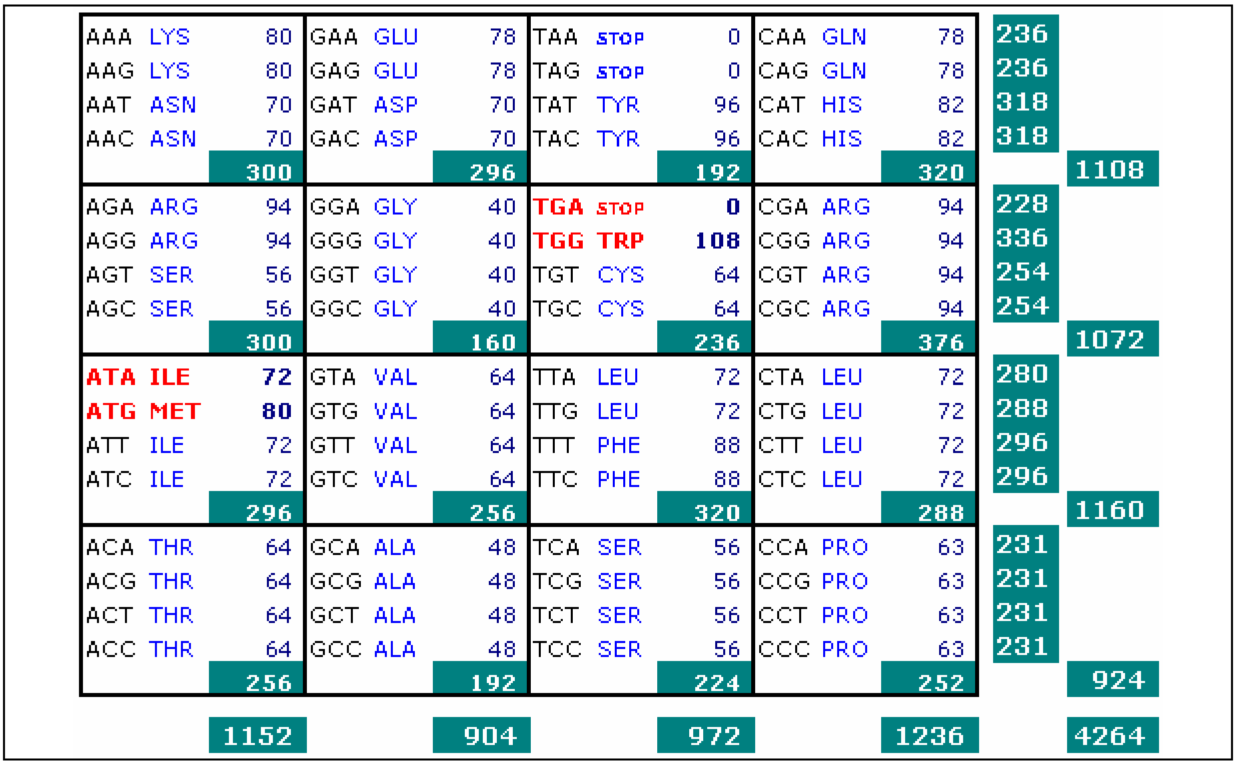
160				**140**	296	**192**	320
112	160	**128**		188			**376**
	256	144	**288**	**144**		**176**	
	192	**224**		256			**252**

2288 = **11** x **13** x 16

SECOND PART OF THE STUDY INCLUDING THE REBEL GROUP INTO ACCOUNTS

Second part study technical introduction

In this second part : phenomena of multiples of prime number 13 only and including the rebel group into accounts.
This genetic code table version is the must representation for a good comprehension of presented phenomena in this study (first and second part). The following table describes the three bases of the codon, the respective coded amino acid and the number of protons contained in the coded amino acid. Here, values of **the rebel group** are taken into accounts. In fat the totals accumulated by protons appear.

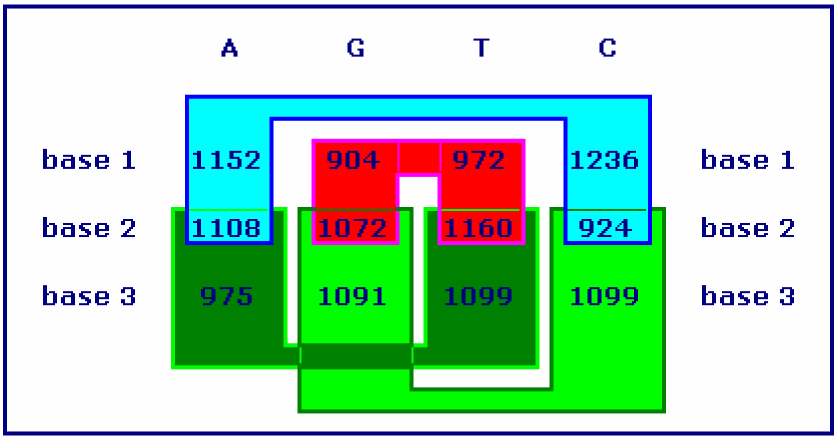


AAA	LYS	80	GAA	GLU	78	TAA	STOP	0	CAA	GLN	78	236	
AAG	LYS	80	GAG	GLU	78	TAG	STOP	0	CAG	GLN	78	236	
AAT	ASN	70	GAT	ASP	70	TAT	TYR	96	CAT	HIS	82	318	
AAC	ASN	70	GAC	ASP	70	TAC	TYR	96	CAC	HIS	82	318	
		300			296			192			320		1108
AGA	ARG	94	GGA	GLY	40	**TGA**	**STOP**	**0**	CGA	ARG	94	228	
AGG	ARG	94	GGG	GLY	40	**TGG**	**TRP**	**108**	CGG	ARG	94	336	
AGT	SER	56	GGT	GLY	40	TGT	CYS	64	CGT	ARG	94	254	
AGC	SER	56	GGC	GLY	40	TGC	CYS	64	CGC	ARG	94	254	
		300			160			236			376		1072
ATA	**ILE**	**72**	GTA	VAL	64	TTA	LEU	72	CTA	LEU	72	280	
ATG	**MET**	**80**	GTG	VAL	64	TTG	LEU	72	CTG	LEU	72	288	
ATT	ILE	72	GTT	VAL	64	TTT	PHE	88	CTT	LEU	72	296	
ATC	ILE	72	GTC	VAL	64	TTC	PHE	88	CTC	LEU	72	296	
		296			256			320			288		1160
ACA	THR	64	GCA	ALA	48	TCA	SER	56	CCA	PRO	63	231	
ACG	THR	64	GCG	ALA	48	TCG	SER	56	CCG	PRO	63	231	
ACT	THR	64	GCT	ALA	48	TCT	SER	56	CCT	PRO	63	231	
ACC	THR	64	GCC	ALA	48	TCC	SER	56	CCC	PRO	63	231	
		256			192			224			252		924
		1152			904			972			1236		4264

Distribution of the total number of protons **(included the rebel group)**				
Base rank	Base A	Base G	Base T	Base C
Rank 1	**1152**	**904**	**972**	**1236**
Rank 2	**1108**	**1072**	**1160**	**924**
Rank 3	**975**	**1091**	**1099**	**1099**

Symmetric values sums multiple of the prime number 13

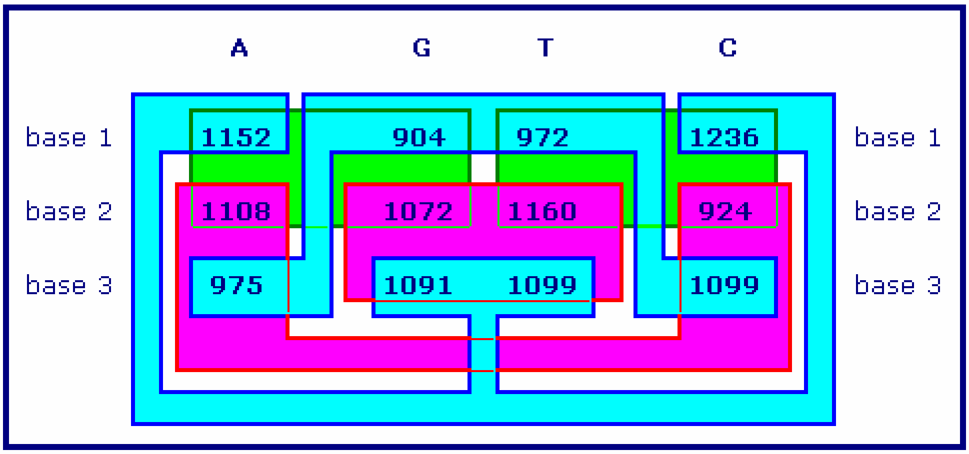
Symmetric and complementary associations of multiples of prime number 13



904 + 1072 + 972 + 1160 = 316 x 13		**1152 + 1108 + 1236 + 924 = 340 x 13**	
904 + 1072 = 152 x 13	**972 + 1160 = 164 x 13**	**1108 + 975 + 1160 + 1099 = 334 x 13**	**1072 +1091 + 924 + 1099 = 322 x 13**

The symmetric sums of these values are quite multiple of **13 in 2 near** :

Symmetric associations of multiples of prime number 13 (in 2 near)



1152 + 904 + 1108 + 1072 = **(326 x 13) – 2**	1108 + 975 + 924 + 1099 = **(316 x 13) - 2**	1152 + 1236 + 1091 + 1099 = **(352 x 13) + 2**
972 + 1236 + 1160 + 924 = **(330 x 13) + 2**	1072 + 1160 + 1091 + 1099 = **(340 x 13) + 2**	904 + 972 + 975 1099 = **(304 x 13) - 2**

Symmetrical associations of multiples of the prime number 13

A column and a square: The symmetrical sums are identical.

300	296	192	320
300	160	236	376
296	256	320	288
256	192	224	252

172 x 13

300	296	192	320
300	160	236	376
296	256	320	288
256	192	224	252

172 x 13

300	296	192	320
300	160	236	376
296	256	320	288
256	192	224	252

156 x 13

300	296	192	320
300	160	236	376
296	256	320	288
256	192	224	252

156 x 13

These subtotal sums are also multiple of the prime number 13

300	296	192	320
300	160	236	376
296	256	320	288
256	192	224	252

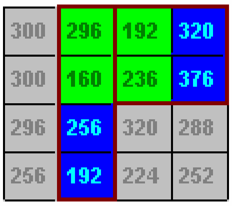
88 x 13

84 x 13

300	296	192	320
300	160	236	376
296	256	320	288
256	192	224	252

88 x 13

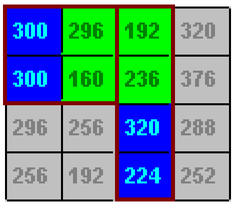
84 x 13



300	296	192	320
300	160	236	376
296	256	320	288
256	192	224	252

88 x 13

68 x 13



300	296	192	320
300	160	236	376
296	256	320	288
256	192	224	252

88 x 13

68 x 13

These configurations implicate 2 others symmetrical associations of 13' s multiples

176 x 13

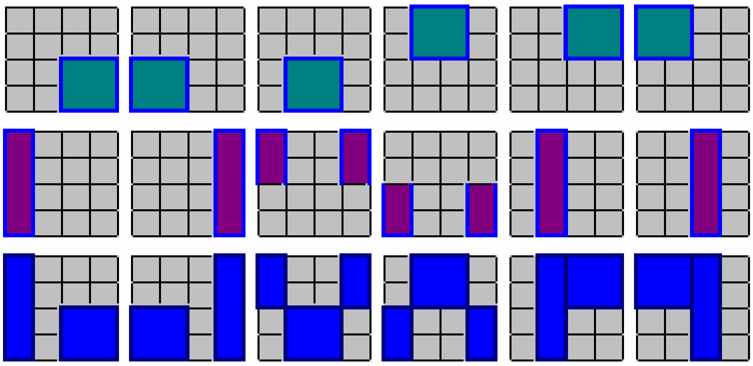
(88 x 13) + (88 x 13)

300	296	192	320
300	160	236	376
296	256	320	288
256	192	224	252

300	296	192	320
300	160	236	376
296	256	320	288
256	192	224	252

152 x 13

(84 x 13) + (68 x 13)

<table>
<tr><td colspan="3">Summary symmetrical associations of multiples of the prime number 13</td></tr>
<tr><td>These 6 squares are associated with…
…These 6 columns (or 2 sub columns)…</td><td></td><td>…To form 6 symmetrical associations of multiples of the prime number 13</td></tr>
</table>

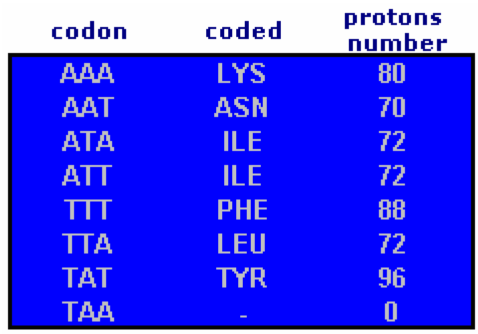
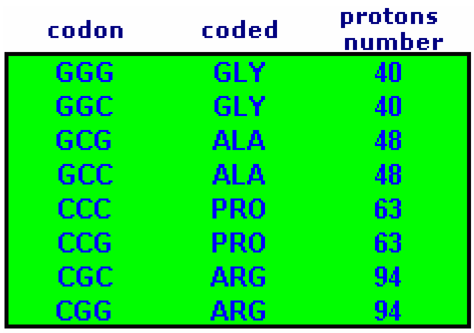
Distribution of the 64 coded in four groups

According to the configuration of the DNA bases of the 64 codons, the 64 coded are distributed into two groupings subdivided in four groups.

<table>
<tr><td colspan="3">Depiction of groupings, groups and codons configuration</td></tr>
<tr><td>grouping</td><td>group</td><td>Codons depiction</td></tr>
<tr><td rowspan="2">GROUPING 1</td><td>Group 1</td><td>Codons with 3 bases A or/and T only</td></tr>
<tr><td>Group 4</td><td>Codons with 3 bases G or/and C only</td></tr>
<tr><td rowspan="2">GROUPING 2</td><td>Group 2</td><td>Codons with 2 bases A or/and T + 1 base G or C</td></tr>
<tr><td>Group 3</td><td>Codons with 2 bases G or/and C + 1 base A or T</td></tr>
</table>

First grouping

This grouping is constituted with 16 codons. In this grouping are represented **10 coded + 1 "coded" STOP**.
In this grouping, the total's number of protons is multiple of the prime number 13 (**80 time 13**). (sub totals are multiple of prime number 11 and prime number 7).

<table>
<tr><td>3 bases A or/and T only</td><td>3 bases G or/and C only</td></tr>
<tr><td>
<table>
<tr><th>codon</th><th>coded</th><th>protons number</th></tr>
<tr><td>AAA</td><td>LYS</td><td>80</td></tr>
<tr><td>AAT</td><td>ASN</td><td>70</td></tr>
<tr><td>ATA</td><td>ILE</td><td>72</td></tr>
<tr><td>ATT</td><td>ILE</td><td>72</td></tr>
<tr><td>TTT</td><td>PHE</td><td>88</td></tr>
<tr><td>TTA</td><td>LEU</td><td>72</td></tr>
<tr><td>TAT</td><td>TYR</td><td>96</td></tr>
<tr><td>TAA</td><td>-</td><td>0</td></tr>
</table>
base A or/and T = 550</td><td>
<table>
<tr><th>codon</th><th>coded</th><th>protons number</th></tr>
<tr><td>GGG</td><td>GLY</td><td>40</td></tr>
<tr><td>GGC</td><td>GLY</td><td>40</td></tr>
<tr><td>GCG</td><td>ALA</td><td>48</td></tr>
<tr><td>GCC</td><td>ALA</td><td>48</td></tr>
<tr><td>CCC</td><td>PRO</td><td>63</td></tr>
<tr><td>CCG</td><td>PRO</td><td>63</td></tr>
<tr><td>CGC</td><td>ARG</td><td>94</td></tr>
<tr><td>CGG</td><td>ARG</td><td>94</td></tr>
</table>
base G or/and C = 490</td></tr>
<tr><td colspan="2">Grouping 1 total number =1040 = 80 x 13</td></tr>
</table>

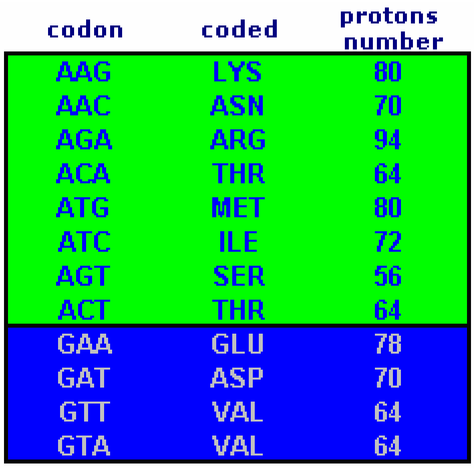
Second grouping

This grouping is constituted with 48 codons. In this grouping are represented **10 other coded + 1 "coded" STOP**. In this grouping, the total's number of protons (**10 other coded)** is multiple of the prime number 13 (**248 time 13**).

Inside this grouping, the total quantity of protons of the coded codons of which have for first base **A** and **G** is multiple of 13 (**122 times 13**). The respective quantity for bases **T** and **C** is (logical consequence) multiple of 13 (**126 times 13**).

More in detail, the respective totals for bases **A** and **G** taken alone are also multiple of 13 (**66 times 13** for **A** and **56 times 13** for **G**) (these totals are respectively multiple of 11 and 7). Respective totals for **T** and **C** are multiple of 13 In 1 near. (**55 and 71 times 13 in 1 near**). (these totals are respectively multiple of 11 in 1 near and of 7 in 2 near).

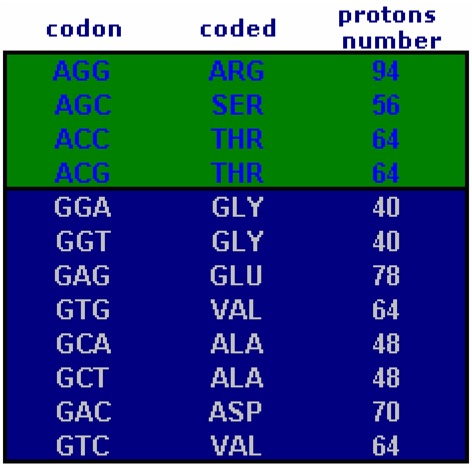
2 bases A or/and T + 1 base G or/and C



codon	coded	protons number
AAG	LYS	80
AAC	ASN	70
AGA	ARG	94
ACA	THR	64
ATG	MET	80
ATC	ILE	72
AGT	SER	56
ACT	THR	64
GAA	GLU	78
GAT	ASP	70
GTT	VAL	64
GTA	VAL	64

first base A = 66 x 13

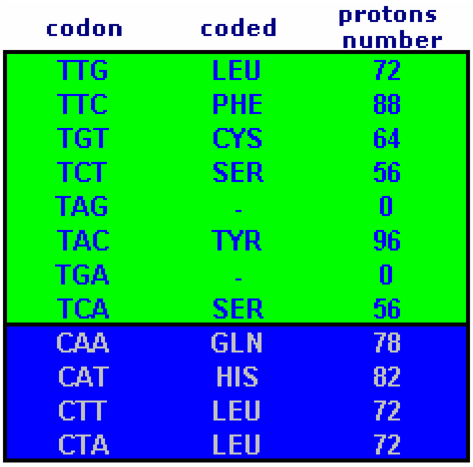
2 bases G or/and C + 1 base A or/and T



codon	coded	protons number
AGG	ARG	94
AGC	SER	56
ACC	THR	64
ACG	THR	64
GGA	GLY	40
GGT	GLY	40
GAG	GLU	78
GTG	VAL	64
GCA	ALA	48
GCT	ALA	48
GAC	ASP	70
GTC	VAL	64

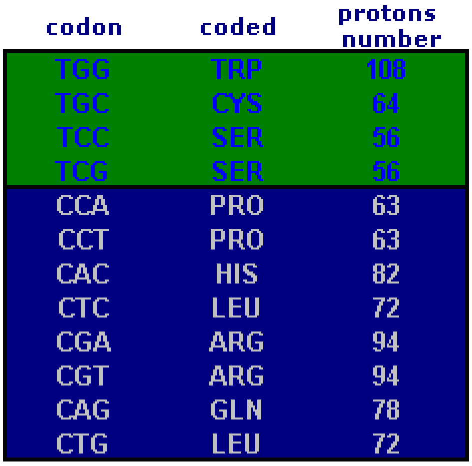
first base G = 56 x 13

Total number (first base A or G) = 122 x 13



codon	coded	protons number
TTG	LEU	72
TTC	PHE	88
TGT	CYS	64
TCT	SER	56
TAG	-	0
TAC	TYR	96
TGA	-	0
TCA	SER	56
CAA	GLN	78
CAT	HIS	82
CTT	LEU	72
CTA	LEU	72

first base T = (55 X 13) + 1



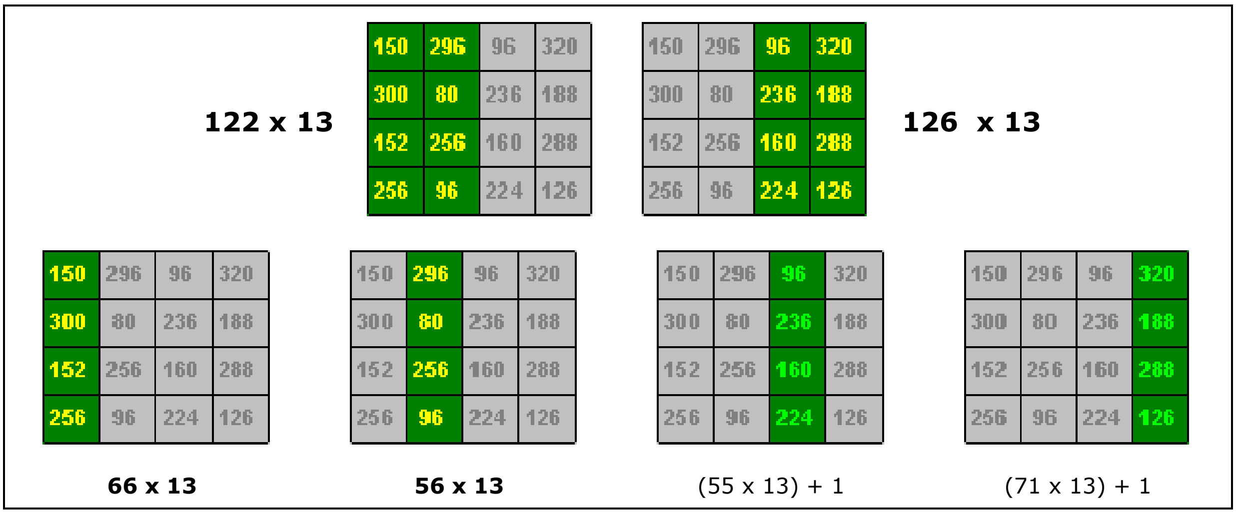
codon	coded	protons number
TGG	TRP	108
TGC	CYS	64
TCC	SER	56
TCG	SER	56
CCA	PRO	63
CCT	PRO	63
CAC	HIS	82
CTC	LEU	72
CGA	ARG	94
CGT	ARG	94
CAG	GLN	78
CTG	LEU	72

first base C = (71 x 13) - 1

Total number (first base T or C)= 126 x 13

Grouping 2 total number = 248 x 13

Phenomena representation in the genetic code table (only with grouping 2 values):



122 x 13

150	**296**	96	320
300	**80**	236	188
152	**256**	160	288
256	**96**	224	126

126 x 13

150	296	**96**	**320**
300	80	**236**	**188**
152	256	**160**	**288**
256	96	**224**	**126**

66 x 13

150	296	96	320
300	80	236	188
152	256	160	288
256	96	224	126

56 x 13

150	**296**	96	320
300	**80**	236	188
152	**256**	160	288
256	**96**	224	126

(55 x 13) + 1

150	296	**96**	320
300	80	**236**	188
152	256	**160**	288
256	96	**224**	126

(71 x 13) + 1

150	296	96	**320**
300	80	236	**188**
152	256	160	**288**
256	96	224	**126**

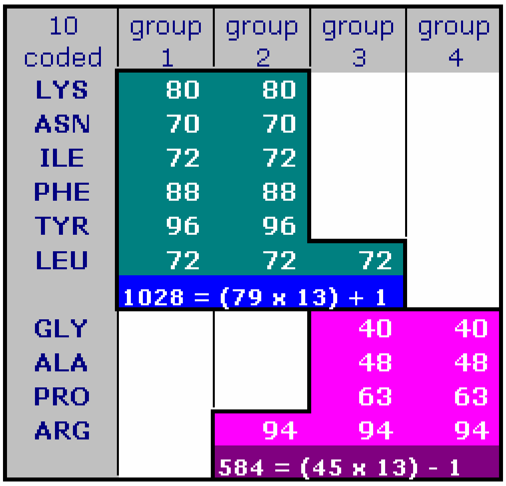
Symmetric and asymmetric distribution of the 20 amino acids

GROUPING 1 (**group 1** and **group 4**)

3 bases A or/and **T only**

3 bases G or/and **C only**

10 coded present in group :



10 coded	group 1	group 2	group 3	group 4
LYS	80	80		
ASN	70	70		
ILE	72	72		
PHE	88	88		
TYR	96	96		
LEU	72	72	72	
	1028 = (79 x 13) + 1			
GLY			40	40
ALA			48	48
PRO			63	63
ARG		94	94	94
		584 = (45 x 13) - 1		

1028 + 584 = 124 x 13

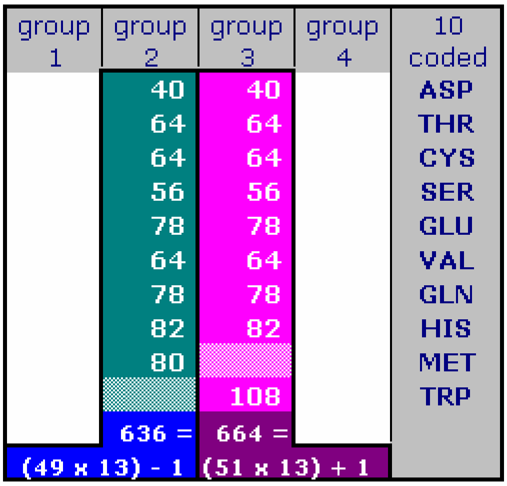
1028 + 636 = 128 x 13

GROUPING 2 (**group 2** and **group 3**)

2 bases A or/and **T + 1 base G** or **C**

2 bases G or/and **C + 1 base A** or **T**

10 others coded present in group :



group 1	group 2	group 3	group 4	10 coded
	40	40		ASP
	64	64		THR
	64	64		CYS
	56	56		SER
	78	78		GLU
	64	64		VAL
	78	78		GLN
	82	82		HIS
	80	▨		MET
	▨	108		TRP
	636 =	664 =		
(49 x 13) - 1		(51 x 13) + 1		

636 + 664 = 100 x 13

584 + 664 = 96 x 13

The distribution of amino acids in the two groupings is, in same time, **perfectly symmetric** and **perfectly asymmetric** :

<table>
<tr><th colspan="2">VERY IMPORTANT ESTABLISHED PHENOMENA
Symmetric and asymmetric phenomena in the repartition of the 20 amino acids</th></tr>
<tr><th>GROUPING 1 (group 1 and group 4)</th><th>GROUPING 2 (group 2 and group 3)</th></tr>
<tr><td>10 amino acids are represented (50%)
(+ 1 STOP)</td><td>10 other represented amino acids
(+ 1 STOP)</td></tr>
<tr><td>No amino acid in common in both groups (group 1 and group 4) and …</td><td>All the amino acids in common in both groups (group 2 and group 3) except …</td></tr>
<tr><td>… Two amino acids are represented twice in the other grouping :
LEU in groups 3 and 2 ARG in groups 2 and 3</td><td>… Two amino acids are represented only in one group :
TRP only in group 3 MET only in group 2</td></tr>
<tr><td>All the amino acids are represented in both groupings: …
… group 1 present in group 2 (other grouping)
and
group 4 present in group 3 (other grouping)</td><td>No amino acid are represented in both groupings: …
group 2 (except MET) in group 3 (same grouping)
and
group 3 (except TRP) in group 2 (same grouping)</td></tr>
</table>

The 26 great codons

In conclusion of this study, a new presentation of the genetic code suggesting to classifying codons and coded in 26 entities: a great codon for a (great) coded . So for example the arginine is not coded 6 times but rather twice by:

A great codon consisted of **2 codons** (AGA and AGG)
A great codon consisted of **4 codons** (CGA, CGG, CGT and CGC)

This table of the genetic code is **symmetric** when one considers the number of coded contained in each of 16 table box. This table contains **26 great codons** among which 13 in both first columns (first DNA base **A and G**) and 13 in both last ones (first DNA base **T and C**):

NEW SYMMETRIC TABLE OF THE GENETIC CODE	
13 GREAT CODONS IN **4 boxes with 1 great codon** **3 boxes with 2 great codons** **1 box with 3 great codons**	**13 GREAT CODONS IN** **4 boxes with 1 great codon** **3 boxes with 2 great codons** **1 box with 3 great codons**

A AA G LYS T AA C ASN 2 great codons	A GA G GLU T GA C ASP 2 great codons	A TA G STOP T TA C TYR 2 great codons	A CA G GLN T CA C HIS 2 great codons
A AG G ARG T AG C SER 2 great codons	A GG G GLY T C 1 great codon	TG A STOP TG G TRP T TG C CYS 3 great codons	A CG G ARG T C 1 great codon
AT A ILE AT G MET T AT C ILE 3 great codons	A GT G VAL T C 1 great codon	A TT G LEU T TT C PHE 2 great codons	A CT G LEU T C 1 great codon
A AC G THR T C 1 great codon	A GG G ALA T C 1 great codon	A TC G SER T C 1 great codon	A CC G PRO T C 1 great codon

The columns of DNA bases **A and T** and DNA bases **G and C** also contain the same number of great codons :
Columns A and T: 1 box of 1 , 2 boxes of 2 and 1 box of 3.
Columns G and C: 3 boxes of 1, and 1 box of 2.

CONCLUSION

It clearly appears in this study that the universal genetic code answers numerical constraints. These numerical constraints connect the configuration of codons with the atomic structure of the respectively coded amino acids.

This study reveals very many phenomena of multiples of prime numbers connecting:

➨ **the codons configuration (triplets of DNA bases)**
to
➨ **the number of protons (or atomic number) constituting the coded amino acids.**

This study also reveals very many facts of symmetry in the distribution of these phenomena. These phenomena observed relate to the whole of the genetic code and are often complementary systematically and very symmetrically.

These phenomena imply the prime numbers:

➨ **7, 11 and 13.**

A very important observation revealed in this study, highlights the association of:

➨ **phenomena of concentration of multiples of the prime number 7 towards coding of the amino acid coded proline**
to
➨ **the a number of times that an amino acid is coded.**

This study largely draws the attention to this particular amino acid of which the general structure is the only one to be distinguished from the other amino acids. All the other amino acids (included in the universal genetic code) have a radical including an odd number of protons. **The proline is the only amino acid to have an even number of it.**

This study also shows the following rule:

Except a named group **the rebel group** (ATA , ATG, TGG and TGA) with a total protons number multiple of the prime number 13, the codons code for the same coded

➨ **if and only if their last base is A or G**

➨ **if and only if their last base is T or C**

This study also proposes a reorganization of the table of the universal genetic code while gathering code them and coded in twenty-six entities. These entities (distributed symmetrically in the table of the genetic code) gather a great codon and a great coded. Thus, this new table of the genetic code includes 26 great codons connected with 26 great coded of which:

➨ **8 great codons-coded of 4 codons-coded**
➨ **14 great codons-coded of 2 codons-coded**
➨ **4 great codons-coded of 1 codon-coded**