

## A Base-4 AUGC Neo-Digibreed Littered with Carcasses: The Aftermath of Genetic Code Exploration

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### ABSTRACT

**Statement of the problem:** The molecular biologists' observation in 1953 that the sequence of the RNA four bases; Adenine, Uracil, Guanine, Cytosine (A, U, G, C) in the nucleus of a cell influenced the sequence of the 20 amino acids of protein in the cellular cytoplasm, as a natural example of the input/output multiplicative replication system in computational combinatorics, calls for base 4 neo-digibreed construction with an input set of the RNA four bases A, U, G, C, as an indirect source of permutations of 4 from 4 of the four RNA bases.

**Method and theoretical orientation:** The four RNA bases A, U, G, C in a sequence are used as input set in base 4 neo-digibreed construction by successive collateral posting to digitality level 4 terminal, wherein 256 quadruplets reside. Distinction between permutation quadruplets and non-permutation quadruplets in terms of isodigitation is made amongst the 256 quadruplets to the effect of isolating non-isodigitated permutation quadruplets by the deletion of non-permutation quadruplets characterized by isodigitation.

**Finding:** 24 permutation quadruplets free from isodigitation emerged on one side of the separation to yield the 24 quadruplet genetic code as the desired outcome of the exploration, while 232 non-permutation quadruplets on the side of isodigitation got deleted out of the 256 quadruplets at digitality level 4 in accordance with the demand of the indirect source of derivation of the genetic code from base 4 AUGC neo-digibreed at digitality 4.

**Conclusion and significance:** The 24 permutation, non isodigitated quadruplets surviving the isodigitation-based deletion of the base 4 neo-digibreed 256 quadruplets consequently represent the fabric of the true genetic code of 24 permutation quadruplet codons as sourced from the base 4 neo-digibreed indirect method of derivation. This 24 quadruplet genetic code enjoys collinearity with a protein type of 20 amino acids, with four spare quadruplets for four time and place based start/stop control signals during protein synthesis.

**Recommendation:** This combinatorically fit and precise genetic code of 24 quadruplet codons is recommended to experimental experts in molecular biology for spelling in order to render it fit for adoption in coding application in protein synthesis studies.

**Keywords:** Isodigitation, Non-isodigitation, Permutation, Quadruplets, Separation

### INTRODUCTION

Both the digibreed with a zero-included input set/base-strength of numerals and the neo-digibreed of zero-less input set/base strength of letters are known as the habitat of the entire community of integral numbers/digitisms. Just as water is the habitat of fish, no matter the species; so is the digibreed/neo-digibreed the habitat of integral numbers/digitism, no matter the variety [1].

However, the composition of the populace is seen differently by different prospectors of numbers/digitisms [2]: the number theorists see it as a mixture of odd and even numbers, with the odd unfolding prime numbers and the even also unfolding super even numbers. The numerationists see additional indigenes such as ditto-digital, nonary and

palindromic numbers and other laminated numbers; while the combinatorists see it as a mixture of permutations and non-permutations only. So when these number prospectors of diverse interests go to exploit the digibreed/neo-digibreed,

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they leave behind different kinds of rejected number categories after making their selective extractions. We are concerned with the outcome of the exploitation of the neo-digibreed of zero less input set/base-strength of A, U, G, C for permutations by the combinatorists for the construction of the genetic code for their molecular biology clients. What we shall find as litters in a neo-digibreed is of much importance to the quality of the genetic code in terms of fabric and structure [3].

## DEFINITIONS, ILLUSTRATIONS AND ANNOTATIONS

### Definitions

**Carcasses:** Worthless remains and discarded.

**Combination:** A group of things chosen from a larger number of dissimilar things without regard to order in the group.

**Digitism:** Digital composition of a number or the set of letters in code words.

**Iso-digitism:** Is the condition in a digitism whereby one or more digits/letters are repeated.

**De-isodigitation:** Is the elimination or removal of digitisms affected by isodigitism.

**Digibreed:** Is number population in sequence to a specified digitality generated by successive collateral posting of a given base strength in which zero is included.

**Digitality:** Is number of digits in a number or letters in digitism.

**Neo-digibreed:** Is a digibreed whose base-strength is zero-less and consists of letters or numerals.

**Permutations:** Is anyone of the possible dissimilar things taken all (full-set selection) or some (subset selection) at a time can be arranged in which order is important.

### ILLUSTRATIONS

Super even numbers include 2, 4, 8, 16, 32, 64... They are represented by the domiciliary formula  $2^n$ , where  $n \geq 1$  and integral. The somatic ratio of a sequence of them is  $2n$ . Their progression is easily freed from the enfolding parent even number sequence by the formula where  $n/2-1$ , where  $n$  is the super even number in flight, and  $n/2-1$  is the flight inter-serial that is the over flight pace to reach the next super even number. The casualties here are the even numbers [3].

### Ditto-digital numbers

At digitality 4, they run from 0001 through 5050 to 9999. In numeration literature they are called Titus numbers, named after a friend of the author.

### Nonary numbers

At digitality 4, they run from 0099 through 1188 to 9900. In numeration literature they are called Gilbert numbers, named after a relation of the author.

### Palindromic numbers

Examples include 0990, 1881...7227, 9009. They retain their magnitude in opposite views. Their other two names are laminated numbers and sandwich numbers.

All the above and many more categories of numbers reside in the digibreed as a matter of nativity.

### Annotations

**Input/output format:** In the first place, divine creation is the supreme example of the input/output format. The spoken word of God as input, and the resulting creation, the manifestation of matter, as the output material in the form of quantity (seen or unseen). It is the infrastructure for permutations and combinations. The genetic code is a striking natural example of a quantitative system featuring the input/output format and goes along with permutations in productivity and textural identity characterized by non-isodigitism. Input/output format is patronized by procreation in animal and plant life. Thus yam planted and yam harvested are the same in kind [4].

Other characteristics include sameness of size of input set digitism and output material digitism, e.g. mango fruit harvested. In permutation, non-isodigital input set must yield non-isodigital output material digitisms. Also there is always a multiplication in numerical quantity in output relative to the input set either in terms of size (yam) or number (grains) and in permutations, factorial  $n!$  For input set of  $n$  units (digits), i.e.,  $nPn=n!$  accompanied by diversification of the input set sequence.

### Textural subpopulations of numbers (digitisms)

The general number population can be subdivided into three subpopulations on textural basis: namely, total isodigitals, partial isodigitals and non-isodigitals.

In total isodigitals, all the digits of digitism are repetitions of one particular digit, e.g. 1111, 2222, 33. In partial isodigitals, some of the digits of digitism are repetitions of one or more digits, e.g. 5050, 122, 211 or the series 1, 10, 100, 1000...

The non-isodigitals have no repetition of any digits in their digitisms, e.g. 12, 314, 4321. A number of these textural subpopulations of numbers serve special interests in Numeration and Combinatorics. For instance, the partial isodigital series 1, 10, 100, 1000... known as Incremental Digitality Counts (IDCs) in Numeration are used in meridian place location and as meridian place values in the organization of the entire number population of whatever base-strength. Similarly, the non-isodigital subpopulation of

numbers is what combinatorics uses in fixing or computing the factorial complements for permutations and combinations for all specifications of set (n) and selection (r) and  ${}_4G_4$ , i.e., full-set selection 4 for genetic code construction. So the texture of the fabric of the true genetic code as an example of permutation can only be made up of non-isodigital formations of A, U, G, C per formation and not otherwise as in the 64 triplet degenerate code which includes 40 isodigital triplets (4 total and 36 partial) [5].

**MATERIALS AND METHODS**

**Materials**

The materials consist of the four RNA nucleotide bases A, U, G, C. The method employs base crossing involving successive collateral posting of the four bases in elongated Punnett Square to digitality level 4 in parity with the input set 4 in digitality for maturity of output material as shown in **Chart 1** at digitality 4 between lines 22-85, which represents a neo-digibreed of zero-less base 4 strength.

The genetic code exploration proper is only centred in digitality 4 region wherein the non-permutations are all crossed out to leave a residue of 24 quadruplet permutation codons for the structure of the true natural genetic code designed for protein synthesis. Nevertheless, non-permutations in the premature digitalities 2 and 3 regions are also crossed out, thereby bringing carcasses that litter the length and breadth of the entire neo-digibreed that is the treasure-trove of the true genetic code.

**Method**

The method comprises implanting a sequence of the four nucleotide bases AUGC as input set in a Punnett Square **Chart 1** and carrying out successive collateral posting until digitality 4 is accomplished. Digitisms with repeated letters (bases) are identified as non-permutations in digitality 4 as well as the premature digitalities of 2 and 3 and are crossed out as seen in **Chart 1**. This leaves a residue of permutations: 24 quadruplets in digitality 4 and also 24 triplets in digitality 3 and 12 doublets in digitality 2.

**Chart 1.** Derivation of 24-quadruplet genetic code from 4 RNA bases, A, U, G, C using Punnett Square with de-isodigitation (Indirect method of Base 4 A, U, G, C Neo-digibreed to digitality level 4 and subjected to de-isodigitation.

| Corridor<br>INPUT                             | OUTPUT                    |               |               |               | Output no. of permutations per line per digitality |              |              |              |
|---|---------------------------|---------------|---------------|---------------|--|--------------|--------------|--------------|
|   | A                         | U             | G             | C             | Line no.   | Digitality 2 | Digitality 3 | Digitality 4 |
| A   | <del>AA</del>             | AU            | AG            | AC            | 2  | 3            |              |              |
| U   | UA                        | <del>UU</del> | UG            | UC            | 3  | 3            |              |              |
| G   | GA                        | GU            | <del>GG</del> | GC            | 4  | 3            |              |              |
| C   | CA                        | CU            | CG            | <del>CC</del> | 5  | 3            |              |              |
| <b>Valid total no. of duplexes per col.</b>   | 3                         | 3             | 3             | 3             |  | 12           |              |              |
| AA  | <del>AAAAUAAG AAC</del>   |               |               |               | 6  |              | -            |              |
| AU  | <del>AUAAUU AUG AUC</del> |               |               |               | 7  |              | 2            |              |
| AG  | <del>AGAAGU AGGAGC</del>  |               |               |               | 8  |              | 2            |              |
| AC  | <del>ACAACU ACG ACC</del> |               |               |               | 9  |              | 2            |              |
| UA  | <del>UAAUAUAG UAC</del>   |               |               |               | 10   |              | 2            |              |
| UU  | <del>UUUUUUUGUUC</del>    |               |               |               | 11   |              | -            |              |
| UG  | <del>UGAUGUUGGUGC</del>   |               |               |               | 12   |              | 2            |              |
| UC  | <del>UCAUCUUCG UCC</del>  |               |               |               | 13   |              | 2            |              |
| GA  | <del>GAAGAUGAGGAC</del>   |               |               |               | 14   |              | 2            |              |
| GU  | <del>GUAGUUGUGGUC</del>   |               |               |               | 15   |              | 2            |              |
| GG  | <del>GGAGGUGGGGGC</del>   |               |               |               | 16   |              | -            |              |
| GC  | <del>GCA GCU GCGGCC</del> |               |               |               | 17   |              | 2            |              |
| CA  | <del>CAACAUCAGCAC</del>   |               |               |               | 18   |              | 2            |              |
| CU  | <del>CUACUUCUGGUC</del>   |               |               |               | 19   |              | 2            |              |
| CG  | <del>CGACGUCGGGGC</del>   |               |               |               | 20   |              | 2            |              |
| CC  | <del>CCACCUCGGGCC</del>   |               |               |               | 21   |              | -            |              |
| <b>Valid total no. of triplets per column</b> | 6                         | 6             | 6             | 6             |  |              | 24           |              |

The latter two categories being premature are discarded, so that only the 24 permutation quadruplets of digitality 4 are gathered as the treasure of the genetic code exploration in the neo-digibreed as depicted in **Chart 1**. Base 4 A, U, G, C neo-digibreed under exploitation for Genetic Code resource.

The 24 permutation quadruplets surviving de-isodigitation of digitality level 4 in **Chart 1** represent the 24 quadruplet genetic code as presented in **Table 1**.

**Table 1.** The new 24 quadruplet genetic code as derived from **Chart 1**.

| S/N   | Output | Source (Chart 1) | Remarks   |
|-------|--------|------------------|---|
| 1     | AUGC   | Line 28 Col 4    | Representing the valid 24 permutation quadruplets of the Genetic Code, valid for coding application upon correct spelling in full |
| 2     | AUCG   | " 29 " 3         |   |
| 3     | AGUC   | " 31 " 4         |   |
| 4     | AGCU   | " 34 " 2         |   |
| 5     | ACUG   | " 35 " 3         |   |
| 6     | ACGU   | " 36 " 2         |   |
| 7     | UAGC   | " 40 " 4         |   |
| 8     | UACG   | " 41 " 3         |   |
| 9     | UGAC   | " 46 " 4         |   |
| 10    | UGCA   | " 49 " 1         |   |
| 11    | UCAG   | " 50 " 3         |   |
| 12    | UCGA   | " 52 " 1         |   |
| 13    | GAUC   | " 55 " 4         |   |
| 14    | GACU   | " 57 " 2         |   |
| 15    | GUAC   | " 58 " 4         |   |
| 16    | GUCA   | " 61 " 1         |   |
| 17    | GCAU   | " 66 " 2         |   |
| 18    | GCUA   | " 67 " 1         |   |
| 19    | CAUG   | " 71 " 3         |   |
| 20    | CAGU   | " 72 " 2         |   |
| 21    | CUAG   | " 74 " 3         |   |
| 22    | CUGA   | " 76 " 1         |   |
| 23    | CGAU   | " 78 " 2         |   |
| 24    | CGUA   | " 79 " 1         |   |
| Total | 24     |                  |   |

Base 4 AUGC neo-digibreed genetic code exploration/litters analysis is done as shown in **Chart 2**.

Chart 2. A, U, G, C neo-digibreed genetic code exploration/litters analysis.

|                | Digibreed/Columns<br>A U G C          | L/No<br>1 | Analysis                                 |   |   |   |    |                   |   |   |                  |                     |   |   |   |    |    |  |
|----------------|---------------------------------------|-----------|--|---|---|---|----|-------------------|---|---|------------------|---------------------|---|---|---|----|----|--|
|                |                                       |           | Number Category/Digitism/Locale/Occupant |   |   |   |    |                   |   |   |                  |                     |   |   |   |    |    |  |
|                |                                       |           | Codons                                   |   |   |   |    |                   |   |   | Carcasses        |                     |   |   |   |    |    |  |
|                |                                       |           | Permutations                             |   |   |   |    |                   |   |   | Non-Permutations |                     |   |   |   |    |    |  |
|                |                                       |           | Non-Isodigitals                          |   |   |   | TL | Total Isodigitals |   |   |                  | Partial Isodigitals |   |   |   | T  |    |  |
|                |                                       |           | A  | U | G | C |    | A                 | U | G | C                | A                   | U | G | C |    |    |  |
| A              | <del>AA</del> AU AG AC                | 2         |  | 1 | 1 | 1 | 3  |                   |   |   |                  |                     |   |   |   |    | 1  |  |
| U              | AU <del>UU</del> UG UC                | 3         | 1  |   | 1 | 1 | 3  | 1                 |   |   |                  |                     |   |   |   |    | 1  |  |
| G              | GA GU <del>GG</del> GC                | 4         | 1  | 1 |   | 1 | 3  |                   | 1 |   |                  |                     |   |   |   |    | 1  |  |
| C              | CA CU CG <del>CC</del>                | 5         | 1  | 1 | 1 | 1 | 3  |                   |   |   | 1                |                     |   |   |   |    | 1  |  |
| <b>Total</b>   | 3 3 3 3                               |           | 3  | 3 | 3 | 3 | 12 |                   |   |   |                  |                     |   |   |   |    | 4  |  |
| <del>AAA</del> | <del>AAAAUAAGAAC</del>                | 6         |  |   |   |   | 0  |                   |   |   |                  |                     |   |   |   |    | 4  |  |
| <del>U</del>   | <del>AUAAUU</del> AUG AUC             | 7         |  |   | 1 |   | 2  | 1                 |   |   |                  |                     | 1 | 1 | 1 | 1  | 2  |  |
| AG             | AGA AGU <del>AGG</del> AGC            | 8         |  | 1 |   | 1 | 2  |                   |   |   |                  |                     | 1 | 1 |   |    | 2  |  |
| AC             | UCA UCU ACG <del>ACC</del>            | 9         |  | 1 | 1 |   | 2  |                   |   |   |                  |                     | 1 |   | 1 |    | 2  |  |
| UA             | <del>UAAUNU</del> UAG UAC             | 10        |  |   | 1 |   | 2  |                   |   |   |                  |                     |   | 1 |   |    | 2  |  |
| <del>UU</del>  | <del>UUUUUUUUGUUC</del>               | 11        |  |   |   | 1 | 0  |                   |   |   |                  |                     | 1 |   |   | 1  | 4  |  |
| UG             | UGA <del>UGU</del> UGG UGC            | 12        | 1  |   |   |   | 2  |                   | 1 |   |                  |                     | 1 | 1 | 1 |    | 2  |  |
| UC             | UCA <del>UCU</del> UCG <del>UCC</del> | 13        | 1  |   | 1 |   | 2  |                   |   |   |                  |                     |   | 1 | 1 | 1  | 2  |  |
| GA             | <del>GAA</del> GAU <del>GAG</del> GAC | 14        |  | 1 |   |   | 2  |                   |   |   |                  |                     |   |   | 1 |    | 2  |  |
| GU             | GUA <del>GUUGUG</del> GUC             | 15        | 1  |   |   | 1 | 2  |                   |   |   |                  |                     | 1 |   | 1 |    | 2  |  |
| <del>GG</del>  | <del>GGAGGUGGGGGG</del>               | 16        |  |   |   | 1 | 0  |                   |   |   |                  |                     |   | 1 |   | 1  | 4  |  |
| GC             | GCA GCU <del>GCGGCE</del>             | 17        | 1  | 1 |   |   | 2  |                   |   |   | 1                |                     | 1 | 1 | 1 | 1  | 2  |  |
| CA             | <del>CAA</del> CAU CAG <del>CAC</del> | 18        |  |   | 1 |   | 2  |                   |   |   |                  |                     | 1 |   |   |    | 2  |  |
| CU             | CUA <del>CUU</del> CUG <del>CUC</del> | 19        |  | 1 |   | 1 | 2  |                   |   |   |                  |                     |   | 1 |   | 1  | 2  |  |
| CG             | CGA CGU <del>CGGCGE</del>             | 20        | 1  |   | 1 |   | 2  |                   |   |   |                  |                     |   |   | 1 | 1  | 2  |  |
| <del>CC</del>  | <del>CCACCUCGCCCC</del>               | 21        | 1  | 1 |   |   | 0  |                   |   |   |                  | 1                   | 1 | 1 | 1 | 1  | 4  |  |
| <b>Total</b>   | 6 6 6 6                               |           | 6  | 6 | 6 | 6 | 24 | 1                 | 1 | 1 | 1                | 9                   | 9 | 9 | 9 | 9  | 40 |  |
| <b>Total</b>   | 24                                    |           | 24                                       |   |   |   | 24 | 4                 |   |   |                  | 36                  |   |   |   | 40 |    |  |

  

|  | Digibreed/Columns<br>A U G C | L/No | Analysis                                 |   |   |   |   |                   |   |   |                  |         |   |   |   |   |  |  |
|--|------------------------------|------|--|---|---|---|---|-------------------|---|---|------------------|---------|---|---|---|---|--|--|
|  |                              |      | Number Category/Digitism/Locale/Occupant |   |   |   |   |                   |   |   |                  |         |   |   |   |   |  |  |
|  |                              |      | Codons                                   |   |   |   |   |                   |   |   | Carcasses        |         |   |   |   |   |  |  |
|  |                              |      | Permutations                             |   |   |   |   |                   |   |   | Non-Permutations |         |   |   |   |   |  |  |
|  |                              |      | Non-Isodigitals                          |   |   |   | T | Total Isodigitals |   |   |                  | Partial |   |   |   | T |  |  |
|  |                              |      | A  | U | G | C |   | A                 | U | G | C                | A       | U | G | C |   |  |  |

|            |                          |    |               |   |   |   |               |   |   |   | Isodigitals |   |   |   |   |
|------------|--------------------------|----|---------------|---|---|---|---------------|---|---|---|-------------|---|---|---|---|
|            |                          |    | A             | U | G | C | A             | U | G | C | A           | U | G | C |   |
| <b>AAA</b> | AAAAAAUAAAAGAAAC         | 22 |               |   |   | 0 |               |   |   |   |             | 1 | 1 | 1 | 4 |
| <b>AAU</b> | AAUAAAUAAAUGAAUC         | 23 |               |   |   | 0 | 1             |   |   |   |             | 1 | 1 | 1 | 4 |
| <b>AAG</b> | AAGAAAGUAAGGAAGC         | 24 |               |   |   | 0 |               |   |   |   |             | 1 | 1 | 1 | 4 |
| <b>AAC</b> | AACAAACUAACGAACC         | 25 |               |   |   | 0 |               |   |   |   |             | 1 | 1 | 1 | 4 |
| <b>AUA</b> | AUAAAUAUAUAGAUAC         | 26 |               |   |   | 0 |               |   |   |   |             | 1 | 1 |   | 4 |
| <b>AUU</b> | AUAAAUUUAUUGAUUC         | 27 |               |   |   | 0 |               |   |   |   |             | 1 | 1 | 1 | 4 |
| <b>AUG</b> | AUGAAUGUAUGG AUGC        | 28 |               |   |   | 1 |               |   |   |   |             | 1 | 1 |   | 3 |
| <b>AUC</b> | AUCAAUCU AUCG AUCC       | 29 |               |   | 1 | 1 |               |   |   |   |             | 1 | 1 |   | 3 |
| <b>AGA</b> | AGAAAGAUAGAGAGAC         | 30 |               |   |   | 0 |               |   |   |   |             | 1 | 1 | 1 | 4 |
| <b>AGU</b> | AGUAAGUUAGUG AGUC        | 31 |               |   |   | 1 |               |   |   |   |             | 1 | 1 | 1 | 3 |
| <b>AGG</b> | AGGAAGGUAGGGAGGC         | 32 |               |   |   | 1 | 0             |   |   |   |             | 1 | 1 | 1 | 4 |
| <b>AGC</b> | AGCA AGCU AGCGAGCC       | 33 |               | 1 |   | 1 |               |   |   |   |             | 1 | 1 | 1 | 3 |
| <b>ACA</b> | ACAAACAUAACAGACAC        | 34 |               |   |   | 0 |               |   |   |   |             | 1 | 1 | 1 | 4 |
| <b>ACU</b> | ACUAACUU ACUG ACUC       | 35 |               |   |   | 1 |               |   |   |   |             | 1 | 1 |   | 3 |
| <b>ACG</b> | ACGA ACGU ACGGACGC       | 36 |               |   | 1 | 1 |               |   |   |   |             | 1 |   | 1 | 3 |
| <b>ACC</b> | ACCAACCUACCGACCC         | 37 |               | 1 |   | 0 |               |   |   |   |             | 1 | 1 | 1 | 4 |
| <b>UAA</b> | UAAAUAUUUAAGUAAC         | 38 |               |   |   | 0 |               |   |   |   |             | 1 | 1 |   | 4 |
| <b>UAU</b> | UAUAUAUUUAUGUAUC         | 39 |               |   |   | 0 |               |   |   |   |             | 1 | 1 |   | 4 |
| <b>UAG</b> | UAGAUAGUUAGG UAGC        | 40 |               |   |   | 1 |               |   |   |   |             | 1 | 1 |   | 3 |
| <b>UAC</b> | UACAUACU UACG UACC       | 41 |               |   | 1 | 1 |               |   |   |   |             | 1 | 1 |   | 3 |
| <b>UUA</b> | UUAUUUAUUUAGUUAC         | 42 |               |   |   | 0 |               |   |   |   |             | 1 | 1 | 1 | 4 |
| <b>UUU</b> | UUUAUUUUUUUGUUUC         | 43 |               |   |   | 0 |               |   |   |   |             | 1 |   | 1 | 4 |
| <b>UUG</b> | UUGAUUGUUUGGUUGC         | 44 |               |   |   | 0 | 1             |   |   |   |             | 1 | 1 | 1 | 4 |
| <b>UUC</b> | UUCAUUCUUUCGUUCC         | 45 |               |   |   | 0 |               |   |   |   |             | 1 | 1 | 1 | 4 |
| <b>UGA</b> | UGAAUGAUUGAGUGAC         | 46 |               |   |   | 1 |               |   |   |   |             | 1 | 1 | 1 | 3 |
| <b>UGU</b> | UGUAUGUUUGUGUGUC         | 47 |               |   |   | 0 |               |   |   |   |             | 1 | 1 | 1 | 4 |
| <b>UGG</b> | UGGAUGGUUGGGUGGC         | 48 |               |   |   | 0 |               |   |   |   |             | 1 | 1 | 1 | 4 |
| <b>UGC</b> | UGCA UGCUUGCGUGCC        | 49 | 1             |   |   | 1 |               |   |   |   |             | 1 | 1 | 1 | 3 |
| <b>UCA</b> | UCAAUCAU UCAG UCAC       | 50 |               |   |   | 1 |               |   |   |   |             | 1 | 1 |   | 3 |
| <b>UCU</b> | UCUAUCUUUCUGUCUC         | 51 |               |   |   | 0 |               |   |   |   |             | 1 | 1 | 1 | 4 |
| <b>UCG</b> | UCGA UCGUUCGGUCGC        | 52 |               |   | 1 | 1 |               |   |   |   |             |   | 1 | 1 | 3 |
| <b>UCC</b> | UCCAUCCUUCCGUCCC         | 53 | 1             |   |   | 0 |               |   |   |   |             | 1 | 1 | 1 | 4 |
|            | <b>Digibreed/Columns</b> |    | <b>Codons</b> |   |   |   | <b>Exuvia</b> |   |   |   |             |   |   |   |   |

|            | A U G C            | L/No  | Permutations    |   |   |   | T | Non-Permutations  |   |   |    |                     |    |    |    | T |
|------------|--------------------|-------|-----------------|---|---|---|---|-------------------|---|---|----|---------------------|----|----|----|---|
|            |                    |       | Non-Isodigitals |   |   |   |   | Total Isodigitals |   |   |    | Partial Isodigitals |    |    |    |   |
|            |                    |       | A               | U | G | C |   | A                 | U | G | C  | A                   | U  | G  | C  |   |
| <b>GAA</b> | GAAAGAAUGAAGGAAC   | 54555 |                 |   |   |   | 0 |                   |   |   |    |                     |    |    |    | 4 |
| <b>GAU</b> | GAUAGAUUGAUG GAUC  |       |                 |   |   |   | 1 |                   |   |   | 11 | 11                  | 11 |    | 1  | 3 |
| <b>GAG</b> | GAGAGAGUGAGGGAGC   |       | 657             |   |   |   | 1 | 0                 |   |   | 11 | 1                   | 11 |    |    | 4 |
| <b>GAC</b> | GACA GACU GACGGACC |       |                 |   | 1 |   | 1 |                   |   |   |    |                     |    |    | 11 | 3 |
| <b>GUA</b> | GUAAGUAUGUAG GUAC  | 58596 |                 |   |   |   | 1 |                   |   |   |    |                     |    |    |    | 3 |
| <b>GUU</b> | GUUAGUUUGUUGGUUC   |       |                 |   |   |   | 0 |                   |   |   | 11 | 11                  | 11 |    |    | 4 |
| <b>GUG</b> | GUGAGUGUGUGGGGUGC  |       | 061             |   |   |   | 1 | 0                 |   |   | 1  | 11                  | 11 |    | 11 | 4 |
| <b>GUC</b> | GUCA GUCUGUCGGUCC  |       |                 | 1 |   |   | 1 |                   |   |   |    |                     |    |    | 1  | 3 |
| <b>GGA</b> | GGAAGGAUGGAGGGAC   | 62636 |                 |   |   |   | 0 |                   |   |   |    |                     |    |    |    | 4 |
| <b>GGU</b> | GGUAGGUUGGUGGGGUC  |       |                 |   |   |   | 0 |                   |   |   | 11 | 11                  |    | 11 |    | 4 |
| <b>GGG</b> | GGGAGGGUGGGGGGGC   |       | 465             |   |   |   | 0 |                   |   |   | 11 | 11                  |    | 11 |    | 4 |
| <b>GGC</b> | GGCAGGCUGGCGGGCC   |       |                 |   |   |   | 0 |                   |   | 1 |    |                     | 1  |    |    | 4 |
| <b>GCA</b> | GCAA GCAU GCAGGCAC | 66676 |                 |   |   |   | 1 |                   |   |   |    |                     |    |    |    | 3 |
| <b>GCU</b> | GCUA GCUUGCUGGCUC  |       |                 |   | 1 |   | 1 |                   |   |   | 1  |                     |    | 11 | 11 | 3 |
| <b>GCG</b> | GCGAGCGUGCGGGCGC   |       | 869             | 1 |   |   | 0 |                   |   |   | 11 |                     | 11 | 11 |    | 4 |
| <b>GCC</b> | GCCAGCCUGCCGGCCC   |       |                 |   |   |   | 0 |                   |   |   | 11 | 1                   |    |    |    | 4 |
| <b>CAA</b> | CAAACAUAAGCAAC     | 70717 |                 |   |   |   | 0 |                   |   |   |    |                     |    |    |    | 4 |
| <b>CAU</b> | CAUACAUAUGCAUC     |       |                 |   |   | 1 | 1 |                   |   |   | 11 | 11                  | 1  |    | 11 | 3 |
| <b>CAG</b> | CAGACAGUCAGGCAGC   |       | 273             |   | 1 |   | 1 |                   |   |   | 11 |                     | 11 |    | 11 | 3 |
| <b>CAC</b> | CACACACUCACGCACC   |       |                 |   |   |   | 0 |                   |   |   |    | 1                   | 11 |    |    | 4 |
| <b>CUA</b> | CUAACUAUCUAGCUAC   | 74757 |                 |   |   |   | 1 |                   |   |   |    |                     |    |    |    | 3 |
| <b>CUU</b> | CUUACUUUCUUGGUUC   |       |                 |   |   |   | 0 |                   |   |   | 11 |                     |    |    | 11 | 4 |
| <b>CUG</b> | CUGA CUGUCUGGCUGC  |       | 677             |   |   |   | 1 |                   |   |   |    | 11                  |    | 11 |    | 3 |
| <b>CUC</b> | CUCACUCUCUCGCUC    |       |                 | 1 |   |   | 0 |                   |   |   | 1  |                     | 1  |    |    | 4 |
| <b>CGA</b> | EGAA CGAU EGAGCGAC | 78798 |                 |   |   |   | 1 |                   |   |   |    |                     |    |    |    | 3 |
| <b>CGU</b> | CGUA CGUUCGUGCGUC  |       |                 |   |   |   | 1 |                   |   |   | 1  |                     |    | 11 | 11 | 3 |
| <b>CGG</b> | CGGACGGUCGGGGCGC   |       | 081             | 1 | 1 |   | 0 |                   |   |   |    | 11                  |    | 11 | 11 | 4 |
| <b>CGC</b> | CGCACGCUCGCGCGCC   |       |                 |   |   |   | 0 |                   |   |   | 11 | 1                   |    |    |    | 4 |
| <b>CCA</b> | CCAACCAUCCAGCCAC   | 82838 |                 |   |   |   | 0 |                   |   |   | 1  | 1                   | 11 | 11 |    | 4 |
| <b>CCU</b> | CCUACCUUCCUGCCUC   | 485   |                 |   |   |   | 0 |                   |   |   | 1  | 1                   | 11 | 1  |    | 4 |



|           |                  |  |  |  |     |   |    |   |   |    |   |   |   |   |     |    |    |    |     |
|-----------|------------------|--|--|--|-----|---|----|---|---|----|---|---|---|---|-----|----|----|----|-----|
| CCG       | CCGACCGUCCGGCCGC |  |  |  |     |   |    | 0 |   |    |   |   | 1 | 1 |     |    | 4  |    |     |
| CCC       | CCCACCCUCCCGCCCC |  |  |  |     |   |    | 0 |   |    |   |   | 1 | 1 | 1   |    | 4  |    |     |
| Codon     | 6 6 6 6          |  |  |  |     | 6 | 6  | 6 | 6 | 24 | 1 | 1 | 1 | 1 | 57  | 57 | 57 | 57 | 232 |
|           | 58 58 58 58      |  |  |  |     |   |    |   |   |    |   |   |   |   |     |    |    |    |     |
| total TPC | 64 64 64 64      |  |  |  |     |   | 24 |   |   | 24 |   | 4 |   |   | 228 |    |    |    | 232 |
| Total     | 256              |  |  |  | 256 |   |    |   |   |    |   |   |   |   |     |    |    |    |     |

Key to Chart 2:

L/No: Line Number

T: Total

The outcome of de-isodigitation process carried out on digitality level 4 of Chart 2 in search of the genetic code is shown in Table 2.

Table 2. The outcome of de-isodigitation process.

| S/N | Base 4 AUGC neo-digibreed population at digitality levels |                              | Status of formation                 |             |   |             | Remarks              |
|-----|---|------------------------------|-------------------------------------|-------------|---|-------------|----------------------|
|     |   |                              | Permutations/Survivors and Location |             | Non-permutation Casualties and Location |             |                      |
|     | Digitality level (d)                                      | Population (b <sup>d</sup> ) | Survivors                           | Location    | Casualties                              | Location    |                      |
| 1   | 1   | 4 singlets                   | 4                                   | Line 1      | -                                       | -           | Input set of 4 bases |
| 2   | 2   | 16 duplets                   | 12                                  | Lines 2-5   | 4                                       | Lines 2-5   |                      |
| 3   | 3   | 64 triplets                  | 24                                  | Lines 6-21  | 40                                      | Lines 6-21  |                      |
| 4   | 4   | 256 quadruplets              | 24                                  | Lines 22-85 | 232                                     | Lines 22-85 |                      |
| Col | 1   | 2                            | 3                                   | 4           | 5                                       | 6           | Column               |

Note (i) The surviving 24 permutation quadruplets at digitality 4 in Table 2 represent the 24 quadruplet genetic code, the long-sought treasure of the base 4 AUGC neo-digibreed indirect source, with the sequence of the quadruplet as shown in Table 1 drawn from the exploitations in Charts 1 and 2. Consequently Chart 2 is littered with 232 non-permutation quadruplets at digitality level 4, besides others at preceding digitality levels.

(ii) Inspection of the data in Table 2 shows that the population of formations of the base 4 AUGC neo-digibreed at every digitality level is given by the formula b<sup>d</sup>, where b is the base strength and d is the digitality of each formation at the level. It shows also that the population of the formations (b<sup>d</sup>) at digitality level (d) is made up of permutations and non-permutations as per columns 2, 3 and 5 whence b<sup>d</sup> = p + c --- (i) where b = base strength = 4; and d = digitality ranging from 1 to 4, from lines 1-4;

p=population of permutations given by nPr, where n = set, and

r=selection for permutation

c=Population of non-permutations

The value of c for the population of non-permutation formations at each digitality level (d) can be deduced thus:- By transposition of eqn (i) we have c = b<sup>d</sup> - p. --- (ii)

So that with eqn (ii)

At line 1, c = 4<sup>1</sup> - 4P<sub>1</sub> = 4 - 4 = 0

At line 2, c = 4<sup>2</sup> - 4P<sub>2</sub> = 16 - 4x3=16-12 = 4 duplexes (carcasses)

At line 3, c = 4<sup>3</sup> - 4P<sub>3</sub> = 64 - 4x3x2 =64-24 = 40 triplets(carcasses)



At line 4,  $c = 4^4 - {}_4P_4 = 256 - 4 \times 3 \times 2 \times 1 = 256 - 24 = 232$  quadruplets (carcasses)

## RESULTS

The results fall into four categories:

- (a) 24 permutation quadruplets (i) from **Table 2** comprising the genetic code and (ii) from **Table 1** comprising the genetic code in a unique sequence being the treasure exploited from the base 4 AUGC neo-digibreed exploration for the genetic code at digitality level 4.
- (b) Casualties of de-isodigitation process affecting numbers of non-permutations.
  - (i) 232 quadruplets at digitality 4 (carcasses)
  - (ii) 40 triplets at digitality 3 (carcasses)
  - (iii) 4 duplexes at digitality 2 (carcasses)
- (c) Numbers of surviving waste products being immature and undersized permutations (i) 24 triplets at digitality 3,

And (ii) 12 duplexes at digitality 2.

- (d) Formulary  $c = b^d - nPr$  for a bonus to academics where  $c$ =non-permutations, the carcasses population in neo-digibreed

$nPr$ =Permutations population

$b^d$ =Population of base-b neo-digibreed at digitality (d)

Since base b neodigibreed population ( $b^d$ )=permutations ( $nPr$ ) + non-permutations (c)

## DISCUSSION

### Why the base 4 AUGC neo-digibreed is littered with carcasses?

The base 4 AUGC neo-digibreed generated by the successive collateral posting method in an elongated Punnett Square to the mature digitality level 4 region is the home of all categories of integral numbers of digitality 4. However, to the combinatorist prospecting for genetic code treasure therein, it is only a mixture of permutations and non-permutations at each of the digitalities 2, 3 and 4. So he separates the two categories by crossing out the non-permutations along the way to leave a residue of 24 permutation quadruplets in the mature digitality 4 region for collection as the treasure found. Therefore, litters numbering 232 isodigital quadruplets in Charts 1 and 2 represent the carcasses (worthless remains) of non-permutations in the region of exploitation for the true genetic code of 24 quadruplets.

### Aftermath of genetic code exploration

Genetic code exploration is more or less a mining activity in the base 4 AUGC neo-digibreed quarry which leaves the landscape littered with 232 worthless remains of non-

permutations after extraction of the genetic code treasure. The fully exploited base 4 AUGC neo-digibreed is evidently a degraded mining site. Why the genetic code survived the decimation visited upon the AUGC Neo-digibreed quadruplet population by de-isodigitation.

The 24-quadruplet genetic code survived the decimation, because of the following four reasons.

And as such, no agency whatsoever can thwart it! This is reminiscent:

- (i) The genetic code is the product of the Creator's substitution of four RNA bases AUGC for twenty amino acids of protein for permutation synthesis for servicing protein synthesis geared to protein type composition and protein type proliferation and diversification with the objective of simplification and canalization of why Jesus Christ (Emmanuel, God with us, Matthew 1 v 23) as God's substitute for mankind to die for the penalty for the sin of the world (John 1 v 29), could not be killed in babyhood, when Herod ordered the killing of all male children from two years downward in Bethlehem and in all the coasts thereof in an attempt to eliminate baby Jesus Christ as a feared rival king (Matthew 2), contrary to God's gracious redemption plan for fallen man (Roman 5 v 12).
- (ii) The 24-quadruplet genetic code survived the de-isodigitation, because it is a sequence of permutation quadruplets which are free from isodigitation of any kind.
- (iii) The genetic code has codon integrity for immunity against the decimation targeted at isodigitation. Codon integrity means a codon has the complete set of four base types as contained in the input set, the forebear. This again is reminiscent of the token of blood on the doorposts of the houses of the Israelites in Egypt for their immunity against the tenth plaque of killing the first born of all Egyptian households and cattle penultimate night of the flight of the Israelites from Egypt (Exodus Chapter 12).
- (iv) Lastly, the 24 quadruplet genetic code owes its preservation from the decimation visited upon the base 4 AUGC neo-digibreed at digitality level 4 by de-isodigitation to integrity and compatibility of its codons, in tandem with the scriptural averment that integrity and uprightness can be waited upon for one's preservation as per Psalm. 25 v 21 which says "let integrity and uprightness preserve me: for I wait on thee", inasmuch as compatibility is the science equivalence of scripture's uprightness, where both command acceptance and acceptability anytime anywhere and are welcome. These analogies between Science and Scripture cited are among many others that reveal the mutuality between them to the extent that they are more profitably utilized

as the two opposite faces of the coin of Creation, where ALL in entirety, seen or unseen, belong.

### The 24 quadruplet genetic code and the minority theory of impurity

The minority theory of impurity states that a few pure healthy grains in the midst of a mass of some other pure healthy grains are doomed to rejection as an impurity. The 24 quadruplet genetic code is represented as permutations in the base 4 AUGC neo-digibreed of 256 quadruplet digitisms (units) wherein 232 quadruplet non-permutations also dwell. The ratio of permutations to non-permutations is given by 24:232::3:29, hence the permutations are in the negligible minority and therefore subject to rejection under the dictates of the minority theory of impurity. Yet, the 24 quadruplets in the base 4 AUGC neo-digibreed, the only indirect source of the true genetic code, is not only able to defy the impurity theory of minority in its habitat, but also to reverse it to the disadvantage of its contemporary in the overwhelming majority, namely the 232 non-permutations. The fate of the non-permutation majority in the base 4 AUGC neo-digibreed from the joint pictorial account by **Charts 1 and 2** concerning the slain members is nothing but dolor (distress and sorrow).

**Observation:** It is observed in Charts 1 and 2 that

- (i) Non-Isodigit plus Non-Isodigit → Non-Isodigit Product
- (ii) Non-Isodigit plus Isodigit → Isodigit Product
- (iii) Isodigit plus Non-Isodigit → Isodigit Product
- (iv) Isodigit plus Isodigit → Isodigit Product

Non-isodigit representing the pure cannot undo isodigit representing the impure as per line (ii), whereas isodigit (impure) can undo non-isodigit (pure) as in line (iii). These results are phenomenal in the material domain in Science and also in Scripture (Haggai 2 v 12-13).

### CONCLUSION

The base 4 AUGC neo-digibreed is a quarry, indeed a treasure-trove from which this combinatorist in recent times has successfully mined the 24 quadruplet permutation codons from the digitality 4 region for his microbiologist clients that are committed to throwing light on the structure of the true genetic code in the context of its involvement in protein synthesis. The most urgent need of the 24-quadruplet genetic code straight from the quarry is neither that of refinement nor purification, but supremely that of spelling, whereby its codons can be experimentally allocated to the 20 amino acids of protein and four place and time based start/stop signals needful and operational in protein synthesis in NATURE. Collinearity between the code and amino acids of protein works on uniqueness of individuals mutually amongst them involving 24 unique quadruplet codons and 20 also unique amino acids of protein on one to one

correspondence, whereby the four spare unique codons serve as four time and place based start/stop control signals during protein synthesis effected by the 24 quadruplet genetic code as the workforce.

### RECOMMENDATION

This 24 quadruplet genetic code being combinatorically sound is recommended to experimental experts in molecular biology, genetics, etc., fields for spelling to render it fit for adoption in coding application in protein studies, so as to free the world of science from the error of the 64-triplet genetic code currently in use.

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