

PRONULIF-2024^[Rc]

SRIRAMACHANDRAN VEERAVALLI

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I. An Ever Ending Introductory Note

This marvelous and gigantic universe is full of excitements. In that, a tiny part is our Mother Earth. Even on earth, from core to its surfacial portion, every tiny particle of matter is so unique irrespective whether it has life or not as per our imagination. The basic physics imagines every object irrespective of size as energy form hence the origin of law of conservation of energy.

Even if we imagine an extremely smaller invisible particle such as electron, the energy as stored in it as PE is equal to $(0.00055 \times 931.5) \text{ meV}$ [assuming $E = mc^2$ be valid]. At the same time, the smallest atom i.e H-atom having one proton (apart from one electron) too has PE (stored energy) equivalent to $(1.0072 \times 931.5) \text{ meV}$ [assuming $E = mc^2$ be valid] though both have same magnitude of charge as a fundamental unit [$1.602 \times 10^{-19} \text{ C}$]. These two particles separated by a distance about 0.37 \AA [from H-H bond length] are said to be held in same way for the past billions of years [even trillion, it may be] since its origin itself is a wonderful and unexplored secret of this universe. From this, all of us knew about other elements including those radioactive.

The ultimate force that binds a number of atoms of different elements in a given species [say DNA or a protein] in same way too, so excited phenomenon. Whether it is a plant or else, i.e an animal, the same set of nitrogenous bases only causing uncountable number of variations.

As every biologist knew about the similarity that exists among all mammals in their zygotic state which later transforms into a distinct, different, typical and specific type of species [say human, pig, dog, cat or else] is really a thought provoking phenomenon. Strangely every microbe too, has the same set of nitrogenous bases [either DNA or RNA based] but every unique species continues to exist almost in same form unless there is any need of change as per any emergency such as environmental issue. The single cell species such as amoeba still there performing all important functions what needed to continue its race so, as humans or plants.

The term life itself is a typical or a unique word which still has many secrets. Even the term death too, because, the same set of microbes cause its biodegradation thus obeying the law of conservation of mass apart from energy. A sort of true-philosophy emerges out when we see birth-growth-death [the 3-stroke cycle] tricolor code [like triplet code of genetics]. As all of us are aware of the fact that, every possible change or feeling or else solely governed by a set of genes [embedded in chromosomes] which in turn made up of energetically different chemical entities where each cell is holding billions of pairs of nitrogenous bases [A=T, G=C A=U] so as to give different expression for different purpose. I always presume that, every purpose which humans think of is purely the creation of human only. Since the code S-E-M [Sleeping-Eating-Mating] is common for all animals [mammals], the origin of life itself has no purpose but merely was an accidentally occurred event. For example, the immense competition among millions of sperms for single egg [as in mammals] is a sort of athletic event in which only one must win the Gold medal [as in Olympics]. The term "I" which defines me as on today was a Gold medalist on a specific point of time as half-body in the course of a beautiful athletic competition where this present "I" won the race against millions or even billions.

This article [you may question me...is there any purpose?] May allow most of us to think of new paths by which the life might be originated or a completely different type of life might be existing elsewhere in this universe with different sets of chemical entities.

II. A Thought Provoking-Research Promoting Debate

No doubt, all living things show marked difference from those sandy systems mainly in movement [body] though living entities were originated from a complex coordination of many non-living worlds. The plants, animals, intermediate species, microbes or else whom we opt life are all made-up of the chemicals with slight to significant variations or compositions. Right from uni-cellular [DNA/RNA based] to a trillion-cell complex species such as humans, the 5-starred nitrogenous bases [ACGTU] along with the pair i.e sugar-phosphate whose unbelievable and ever lasting union within a small invisible region [cell] having unimaginable molecular mass [in u] is really awesome or an irresistible joy when one thinks off it.

Though big-bang concept tried to quote a few lines how this massive universe originated [still expanding], the very beginning source is still unknown i.e Energy or Mass? $E = mc^2$ had linked energy with its

intimate soul mate, the mass, which cover any distance together with aspeed $[3.0 \times 10^5 \text{ km s}^{-1}]$. The astonishing aspect is that all EMR travel with same speed in space so, electric-magnetic field component pair is so well-designed by this nature to make every EMR to cover same distance in unit time [t]. The question is why $C = 3.0 \times 10^5 \text{ km s}^{-1}$? I presume that this is the nature's limit i.e magnetic-electric field pair cannot disturb each other beyond certain limit but, is it a true or reasonable explanation? Einstein's concept had put a limit for the speed of any object not to exceed C value. If not, mass of such an object tends to attain infinite value. Again, question arises about this infinite value. Whether this infinite value represents either the maximum or the minimum since so far, no object could have attained light speed (or) we may not know whether any object in this universe might travel with speed $v > C$?

A scientific bent of mind never be idle hence these many explorations aroused. The search for tiny life and lifeless particle were like a two extreme edges of a diamond made knife. Each one tries to offend the other yet, one cannot be imagined without the other like mass-energy pair. As on today, the continuity of life-cycle on this green planet is purely based on DNA-RNA-Protein-other ingredients, in which each species as isolated system cannot show any so said life but, as one unit, shows rather very simple to an extreme level traits. Each individual as life-supporting is unique and behaves differently in presence of other. The immense beauty that lies with DNA which replicate itself, which creates RNA, which later selects specific α -amino acid and places at specified position/place to bring out a very long polypeptide chain [or a protein/an enzyme]. The ultimate memory that drives any given specific DNA to do all these activities itself astonishing though humans had explored many secrets about such a cycle.

The 23-pair chromosome from each gender which unites to create a zygote under pleasant environment in the uterus of a female body which later divides into a number of fragments with specific memory thereby creating a wonderful baby within the uterine-wall and finally showing this marvelous nature by pushing into this environment is a magnanimous activity by which each one of us stepped on this green planet, started growing [cell division], started showing many characteristic-features, becoming an adult, finally an old living species waiting for re-entry into the same nature either as a mixture of gas-vapour or fragments which are slowly dissipated into food-energy form for various micro-organisms is too, a miraculous activity to observe, experience.

The 23-pairs in which each pair has sacred information about a given individual such as colour (of skin, eye-ball, nails, hair), position of each specific organ [head, eyes, nose, tongue, ears, brain, neck, ribs, heart, lungs, stomach, wind-pipe, alimentary canal, liver, pancreas, kidney anus, genital parts [interior/exterior], muscular pattern, bones, fingers, etc.,] clearly indicates the exceptional memory associated with the genes, which have been functioning in a similar way for the past millions of years (the time-frame). If one starts thinking about these, very often, he or she may develop a sort of scientific-philosophy which draws a sharp-thin line between material based and mental based worlds. I always feel, birth of any human does not have any specific or any special purpose but merely, an accidental phenomenon only [refer part-1].The toughest type competition always begins at the origin of life itself and it continues till that life-form tends to acquire a lifeless form.The strange aspect what I found when I observed the number of chromoso-mal pairs is (though many species have more than 22-pairs autosomal), unlike humans, their distinct expressions/characteristics/etc., far less than us (humans). Of course, explanation for this already exists since every gene need not be always active. Of 25000 genes (approx.), many genes as per observations made by eminent biochemists/biologists/physicists or else, said to be in dormant state or sleeping mode. This suggest that, nature always keeps many genes as spare (or reserve) just to utilize one/more only when there is any need/emergency. I presume that, one specific gene (in specific chromosome) being suppressed by others of same group or the other. So in every chromosome entity, two or more genes must exist which are capable of showing either the same/similar expression, but varying ability. I think these genes as "repairing genes" [as in case of organ-transplantation].When existing gene fails to accept the new/foreign cell, similar (or another mirror image such as enantiomeric pair) gene comes into limelight to perform the duty as that of older one thus allowing the cell to recognize the foreign cell (from the donor). I hypothesize that, "more the complexity of an organ (functions), more the number of genes that it permits to involve incell-division during the growth of a foetus in the uterus".

Table-1: Chromosome Number [C.N]; [Courtesy: www.Google.com]

S.No	Species name	Scientific name	C.N value	Type
[1]	Protozoa	Aulacantha	1600	Diploid
[2]	Amoeba	Amoeba Proteus	250	Haploid
[3]	Field Horse-tail	Equisetum arvense	216	Diploid
[3]-a	Gold fish		94	
[4]	Shrimp	Penaceus semisulcatus	92 (max)	Diploid
[5]	Aquatic rat	Anotomys Leander	92 (max, mammals)	Diploid
[5]-a	Crab eating rat	Ichthyomys Pittieri	92 (max, mammals)	Diploid

[6]	Hedgehog (Africa)	Atelerix albivntris	90	Diploid
[6]-a	Bengal Loach fish	Botia dario	90	Diploid
[7]	Hedgehog [woodland]	Erinaceus	88	Diploid
[8]	Turkey		81, 82	Diploid
[9]	Pigeon		79, 80	Diploid
[9]-a	Duck		80	Diploid
[10]	Bat eared fox	Otocyon megalotis	72	Diploid
[11]	Wolf	Canis lupus	78	Diploid
[12]	Wild dog [African]	Lycaon pictus	78	Diploid
[12]-a	Golden jackal	Canis aureus	78	Diploid
[13]	Maned wolf	Chrysocyon brachyurus	76	Diploid
[14]	White-tailed deer	Odocoileus virginianus	70	Diploid
[14]-a	Guinea pig		64	Diploid
[14]-b	Horse	Equus ferus domestica	64	Diploid
[15]	Donkey	Equus africanus	62	Diploid
[15]-a	Giraffe	Giraffa camelopardalis	62	Diploid
[16]	Cattle	Bos Taurus, B.Indicus	60	Diploid
[16]-a	Cow	Bos primigenius	60	Diploid
[16]-b	Goat	Capra aegagrus hircus	60	Diploid
[17]	Elephant	Elephas	56	Diploid
[17]-a	Capuchin monkey	Cebus X	54	Diploid
[17]-b	Sheep	Ovis aries	54	Diploid
[18]	Duck-billed Platypus	Ornithorhynchus anatinus	52 [10 sex]	Diploid
[19]	Gorilla	Gorilla-gorilla	48	Diploid
[20]-a	Round worm	Ascaris lumbricoides	48	Diploid
[20]-b	Human	Homosepiens	46	Diploid
[20]-c	Rabbit		44	Diploid
[20]-d	Rat		42	Diploid
[20]-e	Rhesus monkey		42	Diploid
[21]	Kangaroo (red)	M.Rufus	40	Diploid
[21]*	Kangaroo	Macropus spp	12*	Diploid
[21]-a	Mouse	Mus-musculus	40	Diploid
[21]-b	Pig	Sus sarofa	40	Diploid
[22]	Lion	Panthera leo	38	Diploid
[22]-a	Tiger	Panthera tigris	38	Diploid
[23]	Honey bee [Europe]	Apis mellifera	32	Diploid
[24]	Frog (British)		26	Diploid
[24]-a	Frog (Indian)		24	Diploid
[24]-b	Toad		24	Diploid
[24]-c	Snail		24	Diploid
[25]	Ant [F = female]	Myrmecia-pilosulla	2 (F)	Diploid

If we notice, there exists no specific relationship between the size of species and the number of chromosomes it has. I opine that, the origin of protozoa [say the first living entity other than plants] with 1600 chromosomes [*does this 1600 = 800 pairs?] may be expected to have many genes (> 25000), keeping in view of 46, in humans. Is it true? For instance, T.Vaginalis, a parasitic [Eukaryote] has about 60,000 protein-coding genes. The fruit-fly has about 13000 protein-coding genes, the mustard plant, Arabidopsis-Thaliana has nearly same number of genes as humans have. So, size of species too, strictly speaking plays no role in deciding the number of protein-coding genes. [refer table-2, Courtesy: Scitable Journal] I opine that, "Brain > Spinal-cord > Liver > Lungs > Heart > Eyes > Kidney > Bone Muscle(s) > Skin > Limbs may be the complexity" [*need not be true], so, of 22-pairs, number of genes needed to describe every minute aspect of every possible organ also follows the same sort of order (*yet to be explored). For instance, brain is like CPU (of computer) which needs to control every possible aspect/change/bio-chemical/biological process (includes all sorts of feelings if any) hence, it's origin/formation must involve maximum number of genes than any other.

The extraordinary memory associated with each cell (i.e DNA in it) becomes the ultimate responsible factor in designing every organ, its position, its function, its efficiency etc., If at all there exists any minute abnormality, it leads to a disorder which is usually rare but cannot be ruled out (*as we observe a few with genetic abnormalities connected with any organ).

III. An Ever-Ending Backward Journey Towards The Origin Of Life

Any exploration of any type was always based on certain degree of imagination which later might be proved or disproved on practical platform. The fundamental particles at subatomic level are the true basic units of each macroscopic object [living/non-living]. The living system to non-living entity is a journey in which many molecular level objects play many roles. This type of journey is eternal so living and non-living things too. Between any two small destinations, we do many works, involve in many activities till, we reach the final platform i.e non-living state.

The true philosophy that inherently exists within this journey is called the life-cycle. In this journey, we, as humans are always more curious than any other species hence exploration is an ever-ending process. As I quoted earlier (part-2), number of genes in any specific species need not always be utilized to their fullest extent though present large in number. This means, a time-based involvement alone brought millions of changes through what we quote by the term organic evolution. The nature always prefers to create a new species that must be superior to its immediate ancestor in many characteristics though 100% not. I presume that, the upcoming future surely going to deliver a new human, which is far superior than what present as on today hence those dormant or recessive genes too, may be utilized in bringing many changes in human body [i.e shape, structure, functionality etc.,]. So, I never think that no single gene is of nonsense type.

The term sense or nonsense is purely a time-based phenomenon. Today's most nonsense act may emerge out as most sense type in future and vice-versa, but at extremely slow pace.

The journey of going backwards in time-frame has many hurdles such as:

The term "Time-frame" itself is both meaningful and meaningless as far as observer in the frame who has consciousness or not.

Eg: For a non-living entity, most of ancestors, coma-state, this consciousness is insignificant.

Between the two, energy and mass, which was elder? [since mass-energy is not isolable to 100% extent]

Discharge tube experiment had disproved atomic theory though the term atom cannot be ruled out at all.

Eg: H-atoms (in DT tube), high voltage → Cathode rays (electrons)+ Anode rays (protons), so if we allow the two distinct streams of particles or rays to interact again, do they give back their original source i.e H-atoms [simplest]? I think, it never be so!

As on today such a process ever been found successful because isolation of H-atom gave one electron-proton pair (as cathode-anode ray pair) means, they were isolated based on energy difference. This process is highly endothermic so, absorption of huge amount of energy led to their isolation. The strange aspects is that though electron and proton have same magnitude of charge (1.6×10^{-19} C) yet differ in mass to a greater extent [$m_p \approx 1836 m_e$ (rest mass)]. This marked difference itself a greatest or unimaginable secret of this nature, which may be the point where human started believing about super-natural power [say God].

Even simplest atom [Hydrogen] and its origin has many hindered secrets though fusion of protium [H^+] leads to heavier particle such as α -particle*. [*Refer atomic physics].

If one assumes light as the ultimate source of all, then, you may question, from where light came or originated? [Does nothing give something?] If so, debate ever ends.... [Long back, in my article i.e Secrets of Universe, I presumed light itself as a ultimate source and hypothesized that interaction of two high-energetic photons must give birth to extremely small particle]

Leaving above question-[in point-5], assuming H-atoms themselves led to all elements in a systematic, extremely slow pace over billions of years [time-factor!], so, a selected number of elements were alone finally led to this life-form. Why cannot others? For example, DNA or RNA is made up of atoms of elements H, C, N, O and P, in a complex form. Now at least few questions arise at this juncture:

Why did β -Ribose, why cannot α -Ribose? [b] Why did Sulphate, why cannot Sulphate or even perchlorate? [note, as NaCl in oceans, chlorine is also very abundant on earth] [c] Why did purine or/and pyrimidine rings why cannot other heterocyclic types (eg: Furan/Thiophene/Imidazole)?

One may give a rationalistic explanation based on biochemical processes taking place in all living systems [Amoeba to Human] for above questions but all those answers are just to satisfy our ego [am so sorry, if you hurt]. Our perceptions mostly focused on what happening but not why happening? So, other than earth, if at all there exists life on some other terrestrial platform in this massive universe, shall we apply the same logic? same explanation? I feel, answer for this specific question as both Yes and No. This because the presently what we explored on earth as far as plants and animals are concerned might not include every species.

My Views [Hypothesis]

The phosphate [PO_4^{-3}] radical that is at C-5 and C-3 positions [both designated as simply 5' and 3'] is true as far as normal pressure [say 1.0 atm = 760.0 mm Hg, sea level] and temperature range [say $0^{\circ}C$ to $50^{\circ}C$], but when we go deeper in an ocean, pressure increases hence I think, even the radical $ClO_4^{(-)}$ (perchlorate) too, likely to involve in many aquatic species under high saline condition [remember oceans usually have abundant Cl^- ions]. Unlike PO_4^{-3} where $C^{(3)}-[PO_4^{-3}]$ or/and $C^{(5)}-[PO_4^{-3}]$ link as seen in DNA, $C^{(3)}$ or $C^{(5)}-[ClO_4^-]$ link is stronger so, cannot be broken so easily as $C^{(3)}-[PO_4^{-3}]$ or/and $C^{(5)}-[PO_4^{-3}]$ hence species having their DNA with $C^{(3)}$ or $C^{(5)}-[ClO_4^-]$ link too, cannot be ruled out.

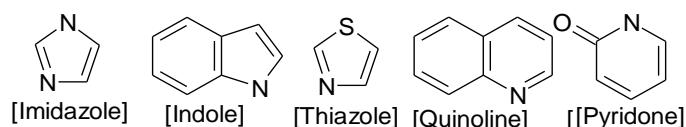
Even $C^{(3)}$ or $C^{(5)}-[SO_4^{-2}]$ link too, not an unusual when we think about species at the deeper part of oceans especially where volcanic eruptions are possible [eg: Pacific-Indonesia]

Here, this triplet radical, [$ClO_4^{(-)}-SO_4^{-2}-PO_4^{-3}$] is isoelectronic, isostructural but stability however follows $ClO_4^{(-)} > SO_4^{-2} > PO_4^{-3}$. However, unlike PO_4^{-3} where we noticed ATP, ADP and AMP, the $C^{(3)}$ or $C^{(5)}$ -

[ClO₄⁻] link or/and C⁽³⁾ or C⁽⁵⁾-[SO₄⁻²] link can be either AMS or ADS [M = mono, D = di, S = sulphate] or AMC [M = mono, C = perchlorate] due to charge-restriction. It is much important to note that PO₄⁻³ is susceptible to hydrolysis [conjugate base of a weak acid, HPO₄⁽⁻⁾] but other two, are not, though every ion gets hydrated.[Note: hydration differs from hydrolysis].

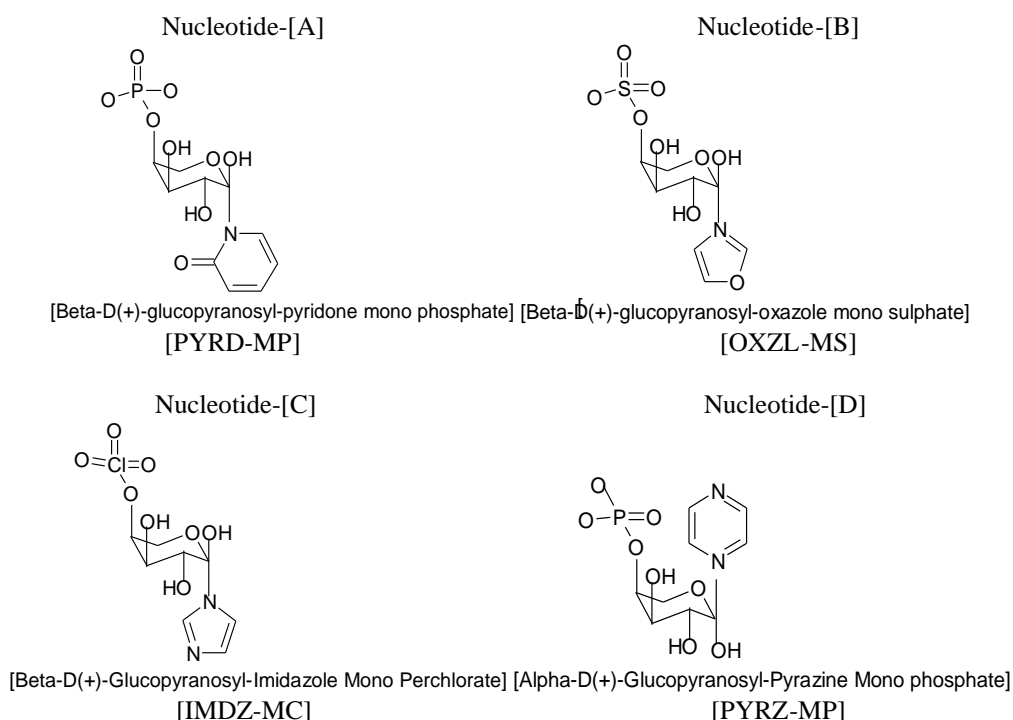
When nitrogenous bases [A,C,G,T,U] are considered, pairing of A-T or A-U and G-C alone found in all DNA/RNA. No doubt, three H-bonds between G and C, two H-bonds between A & T (or U) clearly explains relative stability of such pairs. However, I strongly believe that,

Other heterocyclic moieties too, might be present in species such as [see below]:



As none of the above has any acidic H (i.e. joined to more electronegative atom like N, O etc.), the base pair thus obtained may not be as stable as the usual one hence, such systems may lead to typical DNA^[G]/RNA^[G] [G = glucose] which I opined to exist in species that live in extremely cold climatic conditions either polar region [deeper part of ocean] or in planets where surface shows a very cold state [far less than usual temperature]

Other sugar moieties such as β-D-(+)-Glucose, α-D-(+)-Glucose, also involved in forming a long chain [as in DNA/RNA]. The anomeric C [i.e C-1] must be linked to N-atom or else by the Glycosidic linkage and phosphate or sulphate or perchlorate [based on nature of surroundings] to either C-3 or C-4. So, a new nucleotide results after taking N-base, Sugar and Anion parts. Hypothesized Nucleotides



IV. Does This New Nucleotide Able To Create New DNA?

If we notice the existing basic DNA or RNA [very long poly nucleotide twisted chain], we come to know about four N-bases [A-T-G-C or A-U-G-C] which in contact with Ribose sugar, the later in contact with two phosphate groups [as an average]. This existing DNA has an immense memory that itself held responsible in creating vast number of species [a single cell to a trillion cell].

If one wants to create a new DNA, is it essential to follow the same rules? Thought provoking....!

If one wants to create a new DNA, is it mandatory to stick on to the same base pairing rules?

To answer such questions, we need to do experiments after allowing a mixture of above said [need not always the same 4] artificial nucleotides [A or B or C or D] by taking four different N-bases (or even 5) and check whether they form any polymeric chain or not. As there may be a need of base pairing, one needs to synthesize new N-bases with polar groups [such as NH_2 , OH, SH etc.,] so that, like existing DNA, pairing may likely to occur according to most stable and the possible "Conformation", whose formation must have maximum negative ΔG (spontaneity),.

V. The Protein Synthesis-Codon Role

Every biology/biochemical/pharmaceutical science/biotechnology based student knew that 64 codons play the crucial role in synthesizing specific protein [structural, messenger, enzyme, receptor or else]. For example, the codon AUG is the initiating one that codes Methionine [in case of bacterial phase] while, the pair of UGA, UAA & UAG serves as the stop codons (or terminating).

Strangely, a few α -amino acids are coded by more than 2, even 4. For example,

[i] Alanine is coded by 4 codons [GC-U, GC-C, GC-A, GC-G]

[ii] Cysteine is coded by 2 codons [UG-U, UG-C]

[iii] Glycine is coded by 4 codons [GG-U, GG-C, GG-A, GG-G]

[iv] Leucine is coded by 6 codons [UU-A, UU-G, CU-U, CU-C, CU-A, CU-G] but its isomer i.e Isoleucine however is coded by 3 [50%] codons only [AU-U, AU-C, AU-A]

[v] Arginine is coded by 6 codons [CG-U, CG-C, CG-A, CG-G, AG-A, AG-G]

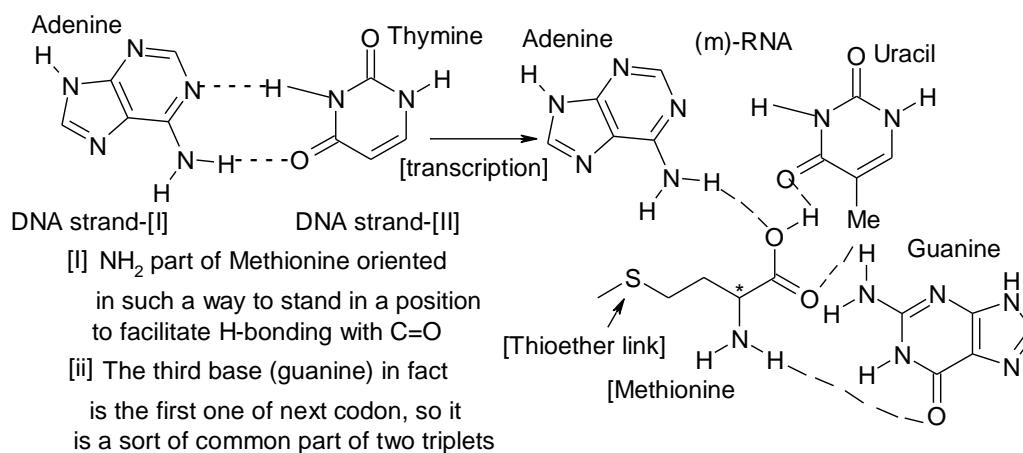
[vi] Serine [which differs from Cysteine just by only one element i.e O (cysteine has S)] is coded by 4 codons [UC-U, UC-C, UC-A, UC-G] [*note: cysteine is coded by 2 codons only]

[vii] Proline, Threonine and Valine are coded by 4 codons each, respectively

[viii] The successive homologous such as Asparagine & Glutamine and Aspartic acid & Glutamic acid (where each one) are coded by 2 codons only.

[ix] The aromatic based Tryptophan, Histidine, Tyrosine and Phenyl alanine are coded by 1 [UGG], 2, 2 and 2 codons respectively [note: the codons, UG-A, UA-A & UA-G are stop codons]

[A hypothetical explanation has been shown below regarding AUG-Methionine interaction]:



In a similar way, we may imagine or visualize a rationalistic scientific explanation regarding all other codons including stop codons. If there exists a structural similarity between two α -AA, I opine that one nucleotide (at least) may be common among various codons. For example, Serine-Cysteine pair differs only by one element i.e S (or O) where [UGU and UGC = Cysteine] and [UCU, UCC, UCA, UCG = Serine] in which whenever there exists a possibility that Ser-Cys pair comes together in a polypeptide, UCU (*equivalent to UGU) or UCC (*equivalent to UGC) prefer over other two (*UCA, UCG = Serine).

In a similar argument or by assumption, Leu-Ile (isomers), the homologues, Gln-Asn, Asp-Glu, Phe-Tyr, Gly-Ala, etc., shall be expected to follow the above trend though formation of every protein with well-defined 3D-conformation is purely an accidental (like a virus formation-its mutation) event.

However, once the nature synthesizes a specific protein (say Insulin) in a specific species, unless there is any specific need/change, the sequence shall remain same in the polypeptide. This consistency is very crucial to avoid cancer-growth or mutation if any.