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Extraterrestrial Contact in Plain English?

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Abstract

Searches for extraterrestrial intelligence in the universe have been going on for decades and are exemplified by the Search for Extraterrestrial Intelligence (SETI) project that searches photons, radio or optical, emanating from outside of planet Earth to locate evidence of extraterrestrial intelligence. However, the findings of amino acids and peptides in meteorites may provide another method for detecting extraterrestrial intelligence. Application of the International Union of Pure and Applied Chemistry-International Union of Biochemistry and Molecular Biology, Joint Commission on Biochemical Nomenclature's unambiguous 1-letter symbolism for the names of amino acids (all letters of the English alphabet except B, J, X, and Z) to the amino acids found in meteorites, reveals that evidence of extraterrestrial intelligence may have already been found. An example is provided.

Discussion

Extraterrestrial life

The possibility of extraterrestrial life in the universe has undoubtedly been pondered for millennia. If it does exist, there is the additional question of whether or not that life is intelligent (i.e., as intelligent as humans). However, in recent years evidence has been accumulating that perhaps extraterrestrial life exists and that it is more intelligent than humans. "…it's highly unlikely that the progression of intelligence and technology would happen at exactly the same pace as on Earth. If it lagged significantly behind, then that planet would plainly reveal no evidence of extraterrestrial life to our radio telescopes. But around a star older than the Sun, life could have had a head start of a billion years or more. Human technological civilization only dates back millennia (at most) – and it may be only one or two more centuries before humans, made up of organic materials such as carbon, are overtaken or transcended by inorganic intelligence, such as AI" (Artificial Intelligence). "Computer processing power is already increasing exponentially, meaning AI in the future may be able to use vastly more data than it does today. It seems to follow that it could then get exponentially smarter, surpassing human general intelligence." [1]

Amino acids and their polymers

Amino acids (AAs) are the monomeric units used by nature to construct AA polymers, called peptides (2-100 AAs) and proteins (>100 AAs) (Figure 1) [2]. Twenty-two different types of AAs are gene-encoded and used by nature to construct peptides and proteins. In 1956, physicist George Gamow suggested the use of single letters of the English alphabet as 1-letter symbols for the names of amino acids commonly found in proteins [3]. Subsequently, the International Union of Pure and Applied Chemistry-International Union of Biochemistry and Molecular Biology, Joint Commission on Biochemical Nomenclature (IUPAC-IUBMB,JCBN) established a nomenclature that utilizes 22 of the 26 letters of the English alphabet, all letters except B, J, X, and Z, as unambiguous 1-letter symbols for the names of the 22 gene-encoded AAs (Table 1) [4-6].

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Figure 1. Amino acid (AA) polymers composed of 2-100 AAs are called peptides. Longer AA polymers are called proteins [2]. In the figure below, "O" represents an AA, and "-" represents a chemical bond (i.e., peptide or amide bond) that links successive AAs in the polymer.

Etc.-O-O-O-O-O-O-O-O-O-O-O-O-O-O-O-O-O-O-O-O-O-O-O-O-O-O-O-O-O-O-O-O-Etc

Table 1. IUPAC-IUBMB, JCBN unambiguous 1-letter symbols for the names of gene-encoded amino acids (AAs) [4-6]. The letters B, X, and Z are ambiguous (i.e., can represent more than one AA), and the letter J has not been assigned to any AA.

AA Trivial name	1-letter symbol	AA Trivial name	1-letter symbol	AA Trivial name	1-letter symbol
Alanine	A	Lysine	K	Serine	S
Cysteine	C	Leucine	L	Threonine	T
Aspartic acid	D	Methionine	M	Selenocysteine	U
Glutamic acid	E	Asparagine	N	Valine	V
Phenylalanine	F	Pyrrolysine	O	Tryptophan	W
Glycine	G	Proline	P	Tyrosine	Y
Histidine	H	Glutamine	Q		
Isoleucine	I	Arginine	R		

Table 2. Amino acids (AAs) found in meteorites. Asterisks indicate those AAs that were, or had been, in peptides.

1-letter symbol	Reference numbers	1-letter symbol	Reference numbers	1-letter symbol	Reference numbers
A*	11, 12	G	11	S	11
D*	11, 12	I	11	T*	11, 12
E	11	L*	11, 12	V*	11, 12
F*	11, 12	P	11	Y	11

This nomenclature has received widespread use in chemistry and molecular biology, and is the method used by the US National Center for Biotechnology Information to store the AA sequences of hundreds of millions of proteins [7].

The name-to-peptide method

The name-to-peptide method utilizes names, or any other sequence of English alphabet letters (e.g., words, sentences, phrases, etc.) as the basis for designing and creating peptides [8, 9]. For example, the sequence of letters in the name of the world's largest retail company, Walmart, could also represent the peptide Tryptophan (W)-Alanine (A)-Leucine (L)-Methionine (M)-Alanine (A)-Arginine (R)-Threonine (T), or WALMART, in the IUPAC-IUBMB,JCBN nomenclature for AAs [10].

Amino acids and (name) peptides in meteorites

Analyses of various meteorites revealed the presence of several free AAs, some of which had been in peptides [11,12] (Table 2). Although it is known that small molecule

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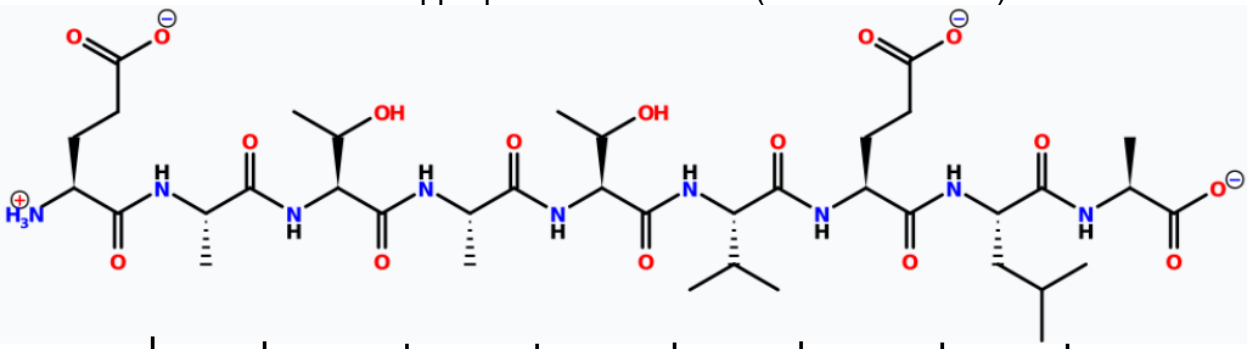
Figure 2. A two-dimensional, bond-line or skeletal model of peptide EATATVELA, generated by the PepDraw v4.0 program [19]. The lines, and solid and dashed wedges, represent covalent chemical bonds connecting carbon (C) atoms (not shown) to other carbon atoms, to hydrogen (H) atoms (colored blue, black, or red), to nitrogen (N) atoms (colored blue), and to oxygen (O) atoms (colored red). The carbon-hydrogen groups, methine (=CH-), methylene (-CH_2-), and methyl (-CH_3), are not shown. Charges (+/-) shown are those that would exist at neutral pH (pH 7). The 1-letter symbols for the names of AAs are shown under the appropriate AA structure (see also Table 1).



organocatalysis is capable of producing peptides without the need for intelligent life [13], it is also possible that intelligent life was the source of peptides in meteorites.

Assuming that extraterrestrial life, if it exists (or existed), is (or was) at least as intelligent as humans, then perhaps it attempted to communicate with Earth. For example, planet HD 85512b is a potentially habitable exoplanet, about 3.6 times more massive than Earth, and located about 35 light-years (205 trillion miles) away from Earth's sun, in the constellation Vela (the Sail) [14]. Vela is within the same galaxy as Earth, the Milky Way. Radio transmissions from Earth to satellites began in 1956 [15], the same year that Gamow suggested the 1-letter symbols for AAs, and if those transmissions continued into the galaxy at the speed of light, they could have been detected on planet HD 85512b by 1991. Radio responses from HD 85512b traveling at the same speed could reach Earth by 2026. If one neglects the speed of transmission by meteorite, could the intelligent life on HD 85512b have sent messages by an alternative method, such as in plain English in the form of name peptides attached to the meteorite (similar to throwing a rock with a paper note attached)?

According to websites that analyze various combinations of English alphabet letters, thousands of words [16] and names [17] can be constructed from just the 1-letter symbols representing the names of AAs found in meteorites. If a collection of AAs found in a meteorite (e.g., one that originated as an interstellar body, such as comet 3I/ATLAS, which is thought to originate in the Milky Way galaxy [18]) contained Alanine (A), Glutamic acid (E), Leucine (L), Threonine (T), and Valine (V), those individual AAs might have been part of the peptide, EATATVELA (Figure 2). By inserting two spaces into the sequence, the peptide becomes EAT_AT_VELA, possibly a simple restaurant ad targeted toward English-understanding, intergalactic, meteorite peptide miners. However, "…direct or indirect detection of macromolecules such as peptides" (in meteorites), "…, remains challenging." [12]. As experimental procedures for the analysis of peptides from

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meteorites improve, perhaps the context of the 1-letter symbols representing their constituent AAs may be revealed and extraterrestrial name peptide messages will be decoded.

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