A Logarithmic Alignment of Common Bioelements and Drugs

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Abstract

This paper identifies a non-random organization in the physicochemical properties that define life.By using a logarithmic network of the form $L = L_0 \cdot e^{A \cdot q}$ it is demonstrated that covalent radii (including water), electronegativity, and topological polar surface area (TPSA) are quantized into integer nodes (q). The results yield significant statistical confidence levels ($P < 0.05$ for radii and electronegativity), utilizing a family of constants derived from Euler's constant (e). This *suggests* that the physicochemical properties of some of the main substances involved in biological processes are fine-tuned according to a fundamental geometric and physical metric that *minimizes structural entropy*.

Keywords:*Biomolecules, Logarithmic network,electronegativity,topological polar surface area,covalent radii.*

1.Introduction

The selection of elements and molecules in the biosphere is typically explained by chemical reactivity and abundance. However, this study proposes an underlying metric constraint. It is postulated that the structural and functional stability of bioelements depends on their alignment with the nodes of a particular *harmonic network* [1]. This network enables *structural resonance* that facilitates homeostasis and energy transfer in living systems.

2. Theoretical Framework: The e-Based Constant Family

Unlike previous empirical models, this formalization *unifies* the network bases (A) as linear displacements of Euler's constant (e), removing arbitrariness in data fitting [2]:

a) TPSA Base:

$$A = \ln(e - 1) = \ln(1.718)$$

b) Electronegativity Base:

$$A = \ln(e - 1 - 1/2) = \ln(1.218)$$

c) Radii Base:

$$A = \ln(e - 1/2 - 1/64) = \ln(1.2027)$$

3. Methodology and Results

3.1. Covalent Radii and the Inclusion of Water

Using the base A = ln(1.203), the radii of basic bioelements were analyzed, including water, H_2O, with an effective radius of 1.97 Å. The analysis yielded a P-Value of 0.0411, indicating *near-perfect quantization* into integer nodes. Key structural elements such as Iron (Fe) and Phosphorus (P) showed exceptional tuning (Residual: 0.0024), while water anchored at Node 7, the same *harmonic* space as key electrolytes

3.2. Electronegativity (Pauling Scale)

With the base A = ln(1.218) and Potassium as the reference, it was observed that the exclusion of Zinc (Zn) as a disruptive transition element allows for a P-Value of 0.0266. This confirms that primary bioelements (C, H, O, N, P, S) occupy *privileged* positions in the electronic potential network.

3.3. Topological Polar Surface Area (TPSA)

For the molecular scale, the base A = ln(1.718) and Cholesterol as L_0 revealed a cluster organization in 50 biomolecules and drugs [3], with a P-Value of 0.0550. This result links pharmacological bioavailability with the specific metric proposed here

4. Discussion and Conclusions

The recurrence of Euler constant across the three most statistically successful metrics suggests that biological Biological processes must meet certain numerical restrictions to effectively fulfill their role in living beings.The *e-Based network* acts as a selection template:Life could have *chosen* a set of components that resonate at integer nodes, allowing for a coherent architecture from the atomic scale to the molecular complexity of modern drugs.

List of substances

Biomolecules (Metabolites & Endogenous Compounds)

Energy & Metabolism: ATP (Adenosine Triphosphate), NADH, Glucose, Fructose, Sucrose, Lactose, Ribose, Urea.

Neurotransmitters & Hormones: Dopamine, Serotonin, Adrenaline (Epinephrine), Melatonin, Cholesterol.

Amino Acids: Glycine, Tryptophan, Glutamate, Serine, Lysine.

Nucleobases: Adenine, Guanine, Cytosine, Thymine, Uracil.

Vitamins: Vitamin C (Ascorbic Acid), Folic Acid.

Drugs (Pharmacological Compounds)

Analgesics & Anti-inflammatories: Aspirin, Ibuprofen, Paracetamol (Acetaminophen), Morphine, Tramadol.

Antibiotics: Penicillin G, Amoxicillin, Ciprofloxacin.

Psychotropics (Anxiolytics & Antidepressants): Diazepam, Alprazolam, Clonazepam, Lorazepam, Fluoxetine, Amitriptyline, Haloperidol.

Cardiovascular & Others**:**

Atorvastatin, Omeprazole, Sildenafil, Warfarin, Losartan, Metoprolol, Lidocaine, Salbutamol, Metformin, Caffeine.

Algorithm codes and result tables are available for anyone who needs them.

5. References

[1] Emsley, J. (2011). Nature's Building Blocks: An A-Z Guide to the Elements. Oxford University Press.

[2] Prasanna, S., & Doerksen, R. J. (2009). Topological polar surface area: A useful descriptor in 2D-
QSAR. Current Medicinal Chemistry, 16(1), 21-41.

[3] https://pubchem.ncbi.nlm.nih.gov/