**K⁺ vs. Na⁺ Driving Force of Prebiotic Peptide Emergence**

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Metal ions in aqueous conditions is one of the triggers of the essence of life. The contradiction between the Na⁺ and K⁺ compositions of seawater and living cell cytoplasm led Yuri Natochin to the hypothesis that the first protocell could have emerged in KCl solution, but not in NaCl, as commonly believed [1]. We investigated the relative effects and concentration dependence of Na⁺ and K⁺ in a model peptide synthesis reaction as well as physical theory for an interpretation of the experimental data. Using HPLC-MS/MS analysis, we found that K⁺ is more than an order of magnitude more effective in the L-glutamic acid oligomerization in aqueous solutions than the same concentration of Na⁺, which is fully consistent with the diffusion theory calculations [2, 3].

Using de novo sequencing algorithm for abiogenic oligopeptide identifying we found that the most effective potassium ion concentrations for the L-Glu peptide yields 1.0 M [4]. Interestingly, potassium complies with all the physical-chemical requirements of accelerated prebiotic polymerisation of amino acids, which is unique in contrast to other mono- and divalent metallic ions. We propose that K⁺ fundamentally predominates Na⁺ as a driving force of the prebiotic peptide formation, regardless of the terrestrial or interstellar origin of amino acids as the first building blocks of life on the Earth.