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Biological Homochirality and Symmertry Breaking of the Universe

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Full explanation of the origin of terrestrial bioorganic homochirality (enantiomeric domination of L-form amino acids in proteins and D-form sugars in DNA/RNA) is one of the most important problems in the origin of life. One attractive hypothesis in the context of astrobiology has been advocated that polarized quantum radiations in space, such as circularly polarized photons or spin-polarized leptons (i.e. electrons, muons), have induced asymmetric conditions on primitive interstellar media (cosmic scenario) [1]. The other hypothesis has been advocated in the context of symmetry breaking of the nature, that is, the biological asymmetry should be universally derived from chiral properties of elementary particles, such as parity violence in weak interaction (intrinsic scenario) [2]. In the latter case, serious problems related to considerable discrepancy between the evolution of matter and the chemical evolution of biological compounds should be universally resolved. These kinds of issues will be discussed based on hierarchical structure of the nature.

References:

[1] Bonner (1991) *Origins of Life and Evolution of Biospheres* 21:59-111. [2] Gardner M (1990) *"The New Ambidextrous Universe" (Third Rivised Edition, W.H.Freeman & Com., New York).*