

# Free-radical mechanisms and biomolecular evolution

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In the report, the role of free radicals in several key processes of biomolecular evolution (production of protobiomolecules and bio-membrane scenario for formation of prebiological systems, comparative radiation-chemical stability and molecular evolution of nucleic acids RNA and DNA, etc.) and use of free-radical probes for study of super-slow molecular dynamics ( $D < 10^{-20} \text{ cm}^2 \text{ s}^{-1}$ ) in biochemically important processes (involved in generation of optical biosignals in photoreceptor membrane) are discussed.

Upon development of biomembrane origin of life scenario on the Earth, in model prebiological conditions, the free-radical photooxidation synthesis of lipid-like amphiphilic molecules was conducted. The dynamics of the formation of membrane structures and incorporation of proteins in membranes was studied. Processes of interaction of biomolecules with free radicals upon radiolysis and metabolism in hydrophilic and hydrophobic areas of bioenvironment were considered. The methods of protection originated via evolution were revealed. The bioevolution significance of differences in mechanisms of concerted reactions of free-radical destruction of nucleic acids via isomerization upon the substitution of the 2'-OH-group with H-atom in the hydrocarbon ring resulting in the formation of desoxyribose DNA was demonstrated.

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