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The Myth of LUCA. Z. Otwinowski, J. Pei, D. Borek, A. Kudlicki, UT Southwestern Medical Center at Dallas, TX 75390.

The uniformity of central metabolism in all forms of life is traditionally explained as a consequence of all known organisms descending from a single, last universal common ancestor (LUCA). Such darwinian view of evolution works well for eukaryotic organisms, but the data for early evolution come only from bacterial species. Archaeal and eubacterial genes coding for core genes involved in protein synthesis are very divergent, without clear presence of intermediate forms. A phylogenetic analysis of other bacterial genes shows extensive horizontal transfer between species, indicating that at the early stages of evolution we should talk about an overall evolution of the gene pool rather than of species. The misinterpretation of LUCA arose from major biochemical and cellular functions co-evolving in Archaea and Eubacteria even after their separation. New rules for phylogenetic analysis are proposed and evidence why these rules are justified in the emerging view of early protein evolution will be presented.