

Abstract:

Mitochondria and plastids were acquired by endosymbiotic event, where prokaryotic organism was engulfed by ancestors of extant eukaryotes. There are more known endosymbiotic events in plastid evolution. In primary endosymbiosis cyanobacterium cell was engulfed by heterotrophic eukaryotic organism. In following secondary, tertiary and quaternary endosymbiotic events eukaryotic cell was engulfed by another eukaryote. Mitochondria originated by engulfment of α -proteobacteria. In the evolution of eukaryotes, reduction of mitochondria occurred in many lineages, making living under anaerobic conditions possible. The least reduced form is anaerobic mitochondria, which together with aerobic mitochondria and hydrogen producing mitochondria, possess genome. Hydrogenosomes and the most reduced form mitosomes, does not possess genome. Plastid reductions led to loss of photosynthetic ability. In last years, more examples of organisms that lost entirely their semi-autonomous organelle, are coming. Loss occur at two parasitic representatives of the Alveolata group, and one endobiotic oxymonad. Parasites *Cryptosporidium parvum* and *Hematodinium* lost nonphotosynthetic plastid, whereas *Monocercomoides* lost its mitochondria. Semi-autonomous organelles were dispensable, because all representatives have access to alternative biosynthetic pathways, or they can substitute the need for synthesis specific compounds by acquisition them from the host.