

Genomic Studies in Bacteria, Mitochondria and Chloroplast in Relation with Endo-Symbiotic Theory

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Abstract- Symbiogenesis, or endosymbiotic theory, is an evolutionary theory that explains the origin of eukaryotic cells from prokaryotes. It states that several key organelles of eukaryotes originated as a symbiosis between separate single-celled organisms. According to this theory, mitochondria, plastids (for example chloroplasts), and possibly other organelles representing formerly free-living bacteria (prokaryotes) were taken inside another cell as an endosymbiont around 1.5 billion years ago. According to Endo-symbiotic theory, mitochondrion and chloroplast has originated from bacteria. But if we compare the genomes of bacteria, chloroplast and mitochondrion there is a difference in the protein synthesizing machineries of all the three structures indicating that they have origination is some thing different from endo-symbiotic theory.

Index Terms- Endo-symbiotic theory, chloroplasts, mitochondrion, pre-cells, evolution, DNA comparisons, Ribosomes, BIO-EDIT software.

I. INTRODUCTION

The theory of symbiogenesis was first articulated by the [Russian](#) botanist [Konstantin Mereschowsky](#) in 1910, although he described the fundamental elements of the theory in a paper five years earlier. Mereschowski was familiar with work by botanist [Andreas Schimper](#), who had observed in 1883 that the division of [chloroplasts](#) in green plants closely resembled that of free-living [cyanobacteria](#), and who had himself tentatively proposed (in a footnote) that green plants had arisen from a symbiotic union of two organisms.^[8] In 1918 the French scientist Paul Portier published *Les Symbiotes* in which he claimed that the mitochondria originated from a symbiosis process. [Ivan Wallin](#) extended the idea of an endosymbiotic origin to [mitochondria](#) in the 1920s. A Russian botanist Boris Kozopoliansky was the first to explain the theory in terms of Darwinian evolution. In his 1924 book *Symbiogenesis: A New Principle of Evolution* he wrote, "**The theory of symbiogenesis is a theory of selection relying on the phenomenon of symbiosis.**"

The theory was advanced and substantiated with microbiological evidence by [Lynn Margulis](#) in a 1967 paper, On the origin of mitosing cells. In her 1981 work *Symbiosis in Cell Evolution* she argued that eukaryotic cells originated as communities of interacting entities, including endosymbiotic [spirochaetes](#) that developed into eukaryotic [flagella](#) and [cilia](#). This last idea has not received much acceptance, because flagella lack DNA and do not show ultrastructural similarities to [bacteria](#).

It is thought that over millennia these endosymbionts transferred some of their own DNA to the host cell's nucleus (called "endosymbiotic gene transfer") during the evolutionary transition from a symbiotic community to an instituted eukaryotic cell. The endosymbiotic theory is considered to be a type of [saltational evolution](#).

II. RESEARCH ELABORATIONS

Here we have compared the protein synthesizing machineries i.e. Ribosomes of bacteria, mitochondria and chloroplast using DNA similarity analyzing BIO-EDIT software.

III. RESULTS OR FINDINGS

It has been found that there is a huge difference among the genes involved in the production of protein synthesizing machineries of bacteria, mitochondrion and chloroplast.

IV. CONCLUSIONS

It has been found that there is a huge difference among the genes involved in the production of proyein synthesizing machineries of bacteria, mitochondrion and chloroplast.

It is a matter of investigation that mitochondrion and chloroplast might have originated as per the need of the cell in the pre-biotic environment.

Before the evolution of mitochondria and chloroplast, the ancestral cells of eucaryotes were thriving in O₂-containing atmosphere without proper O₂ utilising maechanism and depletion of chemicals from haldane's soup made the ancestral cells of eukaryotes to develop mitochondrion and chloroplast separately and a few cell developed both.

REFERENCES

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