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Image Article

Genitic System of Plastids and Mitochondria

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It is widely accepted that plastids and mitochondria changed from bacteria that were overwhelmed by nucleated ancestral cells. As a relic of this evolutionary past, both kinds of organelles contain their own genomes, as well as their own biosynthetic machinery for making organelle proteins and RNA. Plastids and mitochondria and are not ever made from scratch, nonetheless in its place rise by the development and division of a current mitochondrion or plastid. On regular, each organelle must double in mass in each cell generation and then be distributed into each daughter cell. Even nondividing cells must replenish organelles that are degraded as part of the continual process of organelle turnover, or produce additional organelles as the need arises. The process of organelle growth and proliferation is complicated because mitochondrial and plastid proteins are encoded in two places: the separate genomes and nuclear genome harbored in the organelles themselves. How selected proteins and lipids are imported into mitochondria and chloroplasts from the cytosol. Here describe how the organelle genomes are maintained and the contributions they make to organelle biogenesis [Figure1].

The biosynthesis of mitochondria and plastids needs aids from two distinct genetic systems. Most of the proteins in mitochondria and chloroplasts are encoded by special genes devoted to this purpose in nuclear DNA. These proteins are introduced into the organelle from the cytosol after they have been manufactured on cytosolic ribosomes. Other organelle proteins are encoded by organelle DNA and synthesized on ribosomes within the organelle, using organelle-produced mRNA to specify their amino acid sequence. The protein traffic between the cytosol and these organelles appears to be unidirectional, as no known proteins are spread from mitochondria or chloroplasts to cytosol. An exception occurs under special conditions when a cell is about to experience apoptosis. The announcement of intermembrane space proteins (including cytochrome c) from mitochondria through the outer mitochondrial membrane is part of a signaling pathway that is activated in cells undergoing programmed cell death.

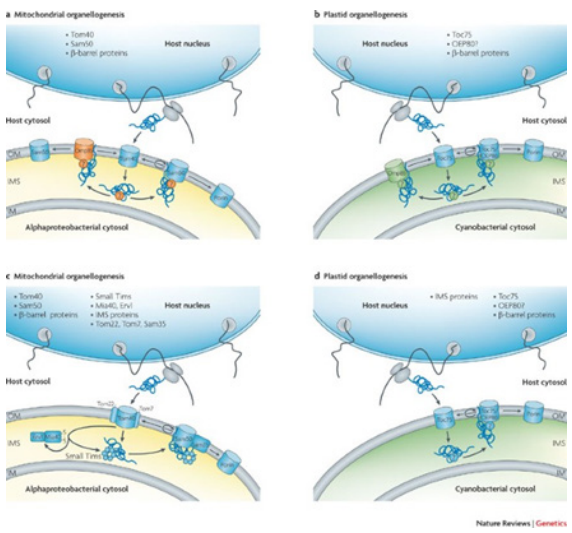

Figure 1: Genetically modified mitochondria and plastids.

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