

Publication

A nuclear mutation that post-transcriptionally blocks accumulation of a yeast mitochondrial gene product can be suppressed by a mitochondrial gene rearrangement

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The nuclear amber mutation, pet494-1, specifically blocks the accumulation of the product of the mitochondrial gene oxi2, cytochrome oxidase subunit III. The pet494-1 mutation does not prevent transcription of the mitochondrial gene since RNA-gel blot hybridizations showed that mutant cells contain normal amounts of an oxi2 transcript, indistinguishable in size from wild-type. A mitochondrial mutation that partially suppresses the nuclear mutation was isolated. The "mitochondrial revertant" behaved as though it contained two different mitochondrial DNAs: one rho+, the other rho-. The suppressor mutation is carried on the rho- mitochondrial DNA and is apparently the result of a gene fusion between oxi2 and another mitochondrial gene, oxi3. This gene rearrangement replaced the normal 5'-non-translated sequence of oxi2 with a portion of the open reading frame of the second intron of oxi3. Novel transcripts of the rearranged gene, containing oxi3 sequences upstream from oxi2 were detected in the mitochondrial revertant. The strain accumulated an electrophoretically variant form of cytochrome oxidase subunit III, probably translated from a new initiation codon. The data are consistent with models in which the PET494 protein acts within the mitochondria to specifically promote the translation of the oxi2 messenger RNA.

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