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THE CHLAMYDOMONAS REINHARDTII CELL
CYCLE

メタデータ	言語: 出版者: 琉球大学21世紀プログラム 公開日: 2007-07-10 キーワード (Ja): キーワード (En): 作成者: Hiramatsu, Takayoshi, Nakamura, Soichi メールアドレス: 所属:
URL	http://hdl.handle.net/20.500.12000/793

**PG-17 MORPHOLOGICAL CHANGES IN MITOCHONDRIAL
AND CHLOROPLAST NUCLEOIDS AND MITOCHONDRIA DURING THE
CHLAMYDOMONAS REINHARDTII CELL CYCLE**

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Morphological changes in the organellar nucleoids and mitochondria of living *Chlamydomonas reinhardtii* were examined during the cell cycle under conditions of 12-h light/12-h darkness. The nucleoids were stained with SYBR-Green I, and the mitochondria were stained with 3,3-dihexyloxacarbocyanine iodide. A mocG33 mutant, which contains one large chloroplast nucleoid throughout the cell cycle, was used to distinguish between the mitochondrial and chloroplast nucleoids. Changes in the total levels of mitochondrial and chloroplast DNAs were examined by Southern blotting, and the nuclear DNA levels were assessed by real-time PCR. Each of the G₁ (period from the end of M phase to the beginning of S phase), S, M, and S(mt,cp) (synthesis of mitochondrial and chloroplast DNAs) phases were estimated.

At the start of the light period, the new daughter cells were in G₁ and contained about 30 mitochondrial and 10 chloroplast nucleoids, which were dispersed and had diameters of 0.1 and 0.2 μ m, respectively. During the G₁ phase of the light period, and at the start of the S phase, both nucleoids formed short threadlike or bead-like structures, divided, and increased continuously in number, concomitantly with DNA synthesis; the nucleoids became smaller due to the decrease probably in DNA amount of each particle and were indistinguishable. The cells in the S and M phases contained extremely high numbers of scattered nucleoids. However, in the G₁ phase of the dark period, the nucleoids again formed short threadlike or bead-like structures, fused, and decreased in number.

The mitochondria appeared as tangled sinuous structures that extended throughout the cytoplasm and resembled a single large mitochondrion. During the cell cycle, the numbers of mitochondrial nucleoids and sinuous structures varied relative to one another.