

Mitochondrial genome of the ancestral dinoflagellate *Oxyrrhis marina*

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SUMMARY

Mitochondrial genomes have evolved in alveolates with drastic changes. Ciliates have a large mitochondrial DNA that contains genes for 2 rRNAs, 7 distinct tRNAs, 21 protein of known function, and 22 ciliate-specific open reading frames (ORFs). By contrast, apicomplexans have the smallest mitochondrial genomes, with only three protein-coding genes—*cox1*, *cox3*, *cob*—and fragmented versions of LSU and SSU rRNAs. These genes are arranged compactly on a 6 kb linear DNA molecule in *Plasmodium falciparum*. To date, mitochondrial genomes in dinoflagellates have been little studied: three mitochondrial genes encoding *cox1*, *cox3*, *cob* and fragmented rRNAs have been isolated. Nevertheless, these results are insufficient to reveal the mitochondrial genome evolution of dinoflagellates.

To gain greater insight into the nature of dinoflagellate mitochondria genomes, we isolated mtDNA from the most ancestral dinoflagellate *Oxyrrhis marina* by CsCl-Hoechst density ultracentrifugation. In this study, we obtained minicircles of various kinds carrying *cox1* and *cob-cox3* fusion genes, respectively, using Minipreps, a kit for isolating circular DNA. Some minicircles also carry fragmented rRNA genes. Furthermore, Southern blotting showed that the respective minicircle molecules are <10 kb. These results suggest that a common ancestor of dinoflagellates and apicomplexans might have retained a highly reduced mitochondrial genome.