
The unforeseen evolutionary history of *Fusarium* mitochondrial genomes

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Mitochondrial genomes are usually considered to be non-recombining; however, our findings in both *Fusarium oxysporum* and *F. graminearum* show that there is mitochondrial recombination within this group. The two groups have quite different lifestyles: *F. graminearum* has homothallic genome organization and has an active sexual cycle, while *F. oxysporum* has a heterothallic genome organization and has a putative parasexual cycle. The fact that these organisms with significantly different lifestyles both have mitochondrial recombination indicates that mitochondrial recombination may be a wide-spread phenomenon in *Fusarium*.

Earlier studies have already detected signs of putative interspecies recombination of the mitochondrial genomes in the *Fusarium fujikuroi* species complex (FFSC). Phylogenetic trees inferred from

different mitochondrial genes gave conflicting topologies. It has also been shown that there is at least a low level of interfertility between species of this group. In our earlier work, we have identified a new variant of the so-called large variable region of the mitochondrial genome. This new variant was found and described in *F. oxysporum*. In our current analysis, we have found this variant in the mitogenome of some of the FFSC members, in all three major clades (African, American and Asian). The distribution of this variant also enforces the fact the interspecies crosses have played an important role in the evolution of the FFSC. Furthermore, it also suggests that there has been genetic exchange between the members of the *F. fujikuroi* and *F. oxysporum* species complexes.
