

Independent Reduction of Meiotic Crossover Pathway 1 in the Alveolates

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Not only was the ancestor of all extant eukaryotes likely meiotically sexual, but it also likely was able to proceed down two crossover pathways. Class 1 pathway uses meiosis-specific genes, has synaptonemal complexes, and crossovers interfere with the formation of nearby crossovers. By contrast, class 2 pathway uses genes also involved in mitosis, has no synaptonemal complexes, and crossovers are non-interfering. Here we evaluate the presence and distribution of these two crossover pathways in the alveolates, using a meiotic gene inventory approach with available genomic and transcriptomic data. We propose that that the ancestor of the alveolates had both meiotic crossover pathways, but class 1 pathway was independently reduced, and synaptonemal complexes lost, in the ciliates and in the dinoflagellates. This reduction may have been due to the non-canonical genome architectures in both of these clades.