

Title: SEARCHING FOR FOOTPRINTS OF ADAPTATIVE EVOLUTION IN THE *ORDOSPORA COLLIGATA* GENOME

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Abstract:

The phylum *Microspora* consists of unicellular endobiotic fungi, which are obligate intracellular parasites and produce spores. The adaptive evolution of these organisms, which are analogous to prokaryotes in having suffered an extreme genome reduction, has been mainly studied by looking at horizontal gene transfer events. However, new approaches to identify possible candidate genes involved in the adaptation of these parasites to their hosts are necessary. The most derived group in microsporidia belongs to the genus *Encephalitozoon*, which infects mainly mammalian hosts. Four species of the genus have had their full genomes sequenced - *Encephalitozoon cuniculi*, *E. intestinalis*, *E. hellem* and *E. romaleae*. *Ordospora colligata* is the most ancestral species described in this group being the only one that infects microcrustaceans invertebrates from the genus *Daphnia*. Both *O. colligata* and the species of the genus *Encephalitozoon* have very similar genomes, but distinct lifestyles and different development modes. The excess of nucleotide divergence (K) of *O. colligata* in relation to the genetic polymorphism (Pi) within the genus *Encephalitozoon* indicates genes that have undergone major changes over this evolutionary jump. The objective of this study is to investigate the possible candidate genes that have undergone adaptive evolution in the passage of an invertebrate to the vertebrate host. Therefore, we use bioinformatics softwares and genome databases in order to calculate the ratio of divergence to genetic polymorphism using nucleotide sequence alignments derived from complete genomes of the five species analyzed. We consider a gene showing $K/Pi > 2.0$ highly divergent. We found 233 genes considered highly divergent. Categorizing them according to a functional hierarchy, an enrichment in genes involved in the control of cell cycle and transport is found. This may indicate that, although encephalitozoonids and *O. colligata* have similar genomes, their way of interaction with host cells is very different.

Keywords: *Ordospora colligata*; *Encephalitozoon*; Microsporidia; Divergence.

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