

Séminaire du Lundi 28 novembre 2016 – 11h –

Séminaire invité

Institut des Sciences de l'Evolution de Montpellier

Salle Louis Thaler, Bât 22, 2^{ème} étage

Université de Montpellier (Campus Triolet)

Place Eugène Bataillon, 34095 Montpellier, France

GENOMIC EVIDENCE FOR AMEIOtic EVOLUTION AND GENETIC EXCHANGES IN THE BDELLOID ROTIFER *ADINETA VAGA*

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Abstract:

Loss of sex is an evolutionary dead end for metazoans, but bdelloid rotifers, micro-invertebrates abundantly found in semi-terrestrial habitats such as lichens and mosses, challenge this view having persisted asexually for millions of years. We found that the genome structure of the bdelloid lineage *Adineta vaga* is indeed incompatible with conventional meiosis. At gene scale, the genome is tetraploid and comprises anciently duplicated segments and less divergent allelic regions. However, in contrast to sexuals, the allelic regions are rearranged and sometimes found on the same chromosome. Such genomic architecture impedes meiotic pairing, confirming their ameiotic evolution. Instead, we found abundant evidence of gene conversion, limiting the accumulation of mutations in the absence of meiosis. Gene conversion may occur during mitotic recombination repair of broken DNA following cycles of desiccation and rehydration experienced by bdelloids in their temporary habitats. Indeed during desiccation the genome of *A. vaga* is broken in hundreds of DNA fragments that get repaired once rehydrated.

In the genome of *A. vaga* 8% of the genes are likely of non-metazoan origin and probably acquired horizontally. These genes appear to be functional and many of those involved in resistance to desiccation have been acquired through HGT. Moreover, combining nuclear and mitochondrial markers, we demonstrated recently intra- and inter-specific genetic exchanges within the lineage *A. vaga* suggesting a non-meiotic recombination mechanism. Whether genetic exchange via HGT is a key innovative mechanism in those eukaryotes allowing adaptation in the absence of sex is an important question we are investigating currently.

Selected recent publications:

DeBortoli N...[Van Doninck K](#). Genetic Exchange among Bdelloid Rotifers Is More Likely Due to Horizontal Gene Transfer Than to Meiotic Sex. *Curr Biol*, 2016

Pigneur LM...[Van Doninck K](#). Genetic uniformity and long-distance clonal dispersal in the invasive androgenetic Corbicula clams. *Mol Ecol*, 2014

Hespeels B...[Van Doninck K](#). Gateway to genetic exchange? DNA double-strand breaks in the bdelloid rotifer *Adineta vaga* submitted to desiccation. *J Evol Biol*, 2014

Flot JF...[Van Doninck K](#). Genomic evidence for ameiotic evolution in the bdelloid rotifer *Adineta vaga*. *Nature*, 2013