Adaptation of the gypsy retroviral family to its host Drosophila melanogaster

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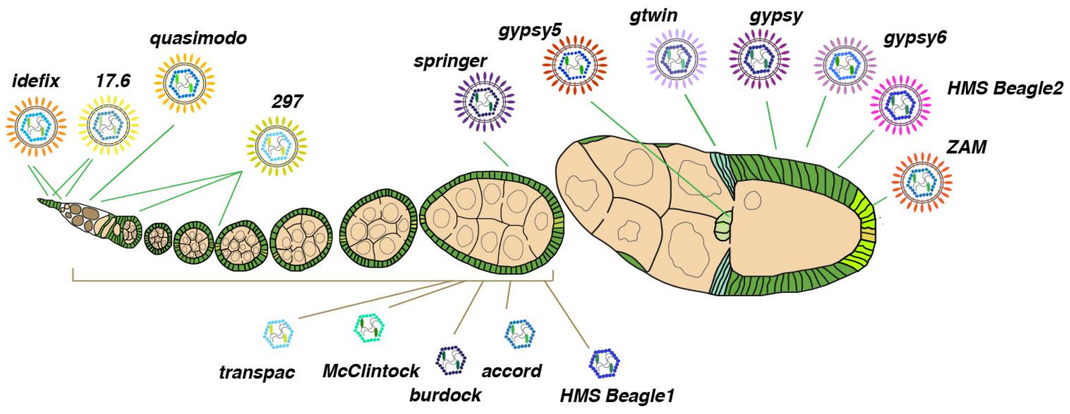
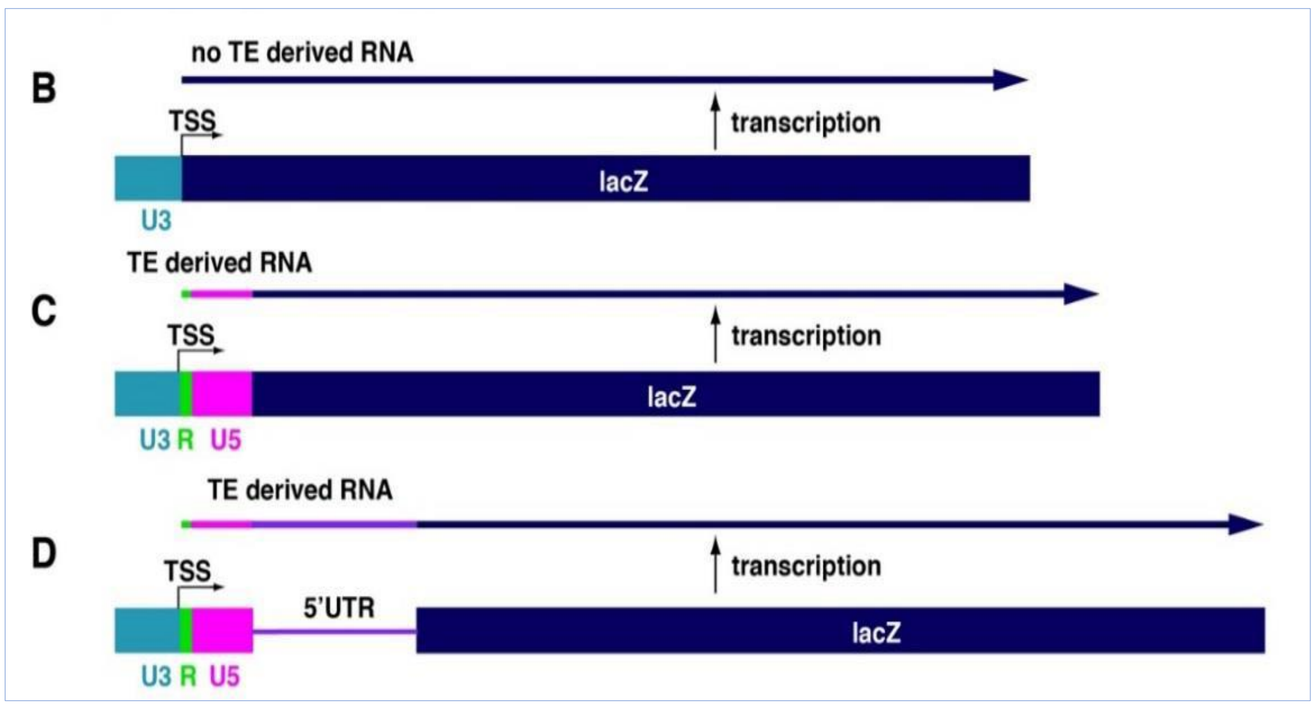
Abstract : Different exogenous retroviruses specifically infect a diversity of vertebrate somatic cells and cause a variety of diseases. Throughout evolution, retroviruses also infected germline cells of their hosts generating numerous endogenous retroviral insertions in their genomes. It remains **poorly understood why** and **how retroviruses** functionally **diversified**. In insects, an ancestral *gypsy*-type LTR-retro-element acquired an envelope ORF from a DNA-Baculovirus. This led to an **endogenous *gypsy* retrovirus** capable of infecting other cells. This novel retrovirus actively replicated in the *Drosophila* ovary ecosystem and diversified to form a large, monophyletic retroviral clade.



Diversification of the gypsy/gypsy clade within Drosophila's ovary

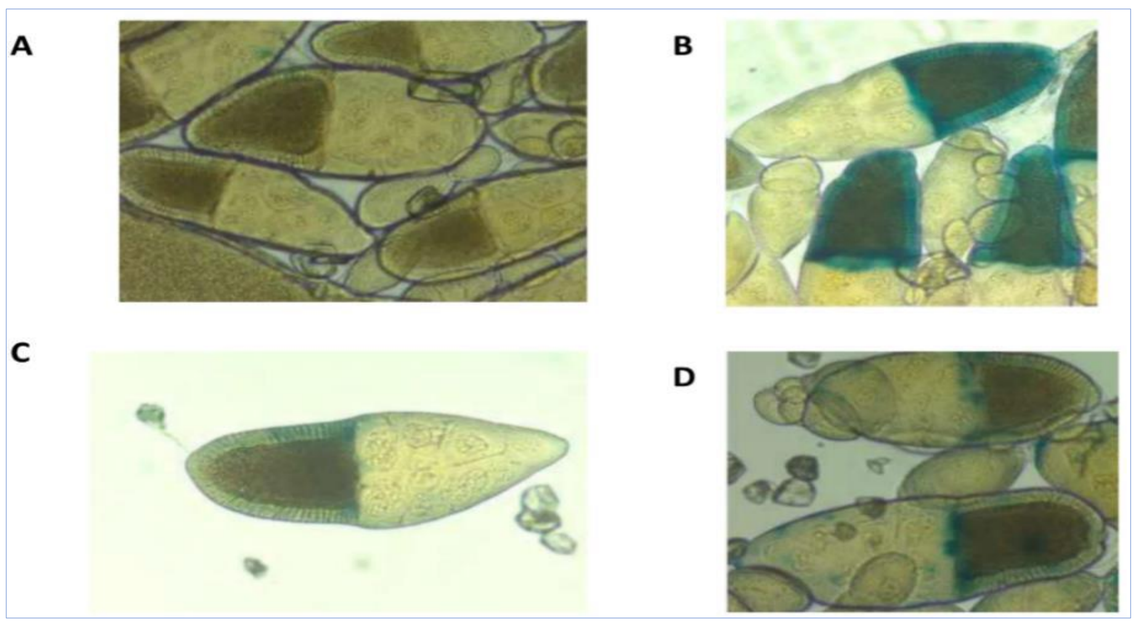
Aim : The key evolving retroviral sequence features were: The LTR and the envelope coding capacity. To understand retroviral evolution and biology in the *Drosophila* ovary, we used LacZ gene expression driven by LTR from different retroviruses or retro-elements within this clade. Our results show the pattern of expression of members within a retroviral clade called the *gypsy* clade.

Key experiment: Schematic overview of the *LTR*-LacZ construct

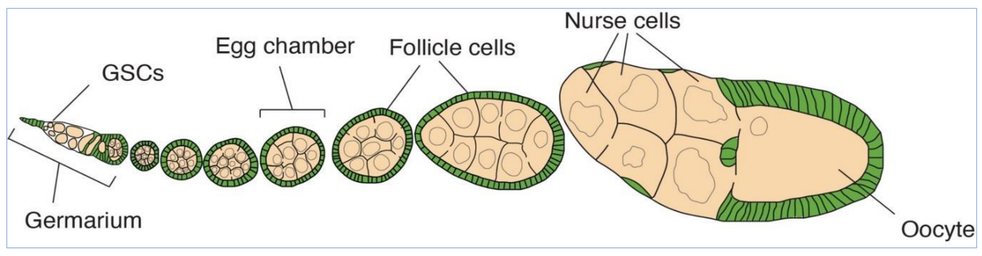


In order to analyze pattern of retroviruses' expression in the *drosophila's* ovaries, their LTR were split in three different constructs and cloned just before a reporter genre called LacZ. **B.** U3 sequence of the LTR was amplified upstream of LacZ gene. **C.** Whole LTR was cloned upstream of LacZ gene. **D.** Whole LTR and 5' untranslated region involved in expression regulation was cloned upstream of LacZ gene. Only the construct **B** is supposed to drive expression of LacZ and therefore a blue staining because the U3 sequence isn't targeted by expression regulators RNA called piRNA, contrarily of the constructs **C** and **D**.

RESULTS : *Gypsy's* pattern of expression in *drosophila's* ovaries, bright field images of *gypsy* reporter ovarioles stained for β-GAL activity



A : No LTR
B : U3 *gypsy* LTR
C : Whole *gypsy* LTR
D : *gypsy* LTR + 5'UTR sequence



Conclusion : Based on what is known in the litterature, *gypsy*'s retrovirus is supposed to be expressed within the **follicle cells (green)**. Control in **A** shows no expression as expected. Picture **B** shows a staining in all the follicle cells. Pictures **C** and **D** display a weak staining coming from the piRNA repression that is taking place in the *drosophila's* ovaries.

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