

Evolutionary dynamics of transposable elements activity and regulation in the endangered Apennine yellow-bellied toad (*Bombina pachypus*)

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INTRODUCTION

Transposable elements (TEs) are DNA sequences that replicate and mobilise within a host genome, playing a major role in genome size expansion¹.

The evolutionary dynamics interplaying between TE expansion and host silencing machinery are poorly studied in large genomes²⁻³.

Here, we investigate TE and silencing pathways activity in the Apennine yellow-bellied toad (*Bombina pachypus*), an endangered anuran species with a 10 Gb genome, shedding light on the complex dynamics acting between TEs and the host genome.

METHODS



5 samples: 3 males, 2 females

3 tissues: Brain, Testes, Ovaries

Transcriptome assembly + mRNA-seq raw reads

- TE detection and TE expression library construction + expression and DE analyses
- Characterization and Expression of TE-regulatory gene pathways functional annotation + expression and DE analyses

TE Expression

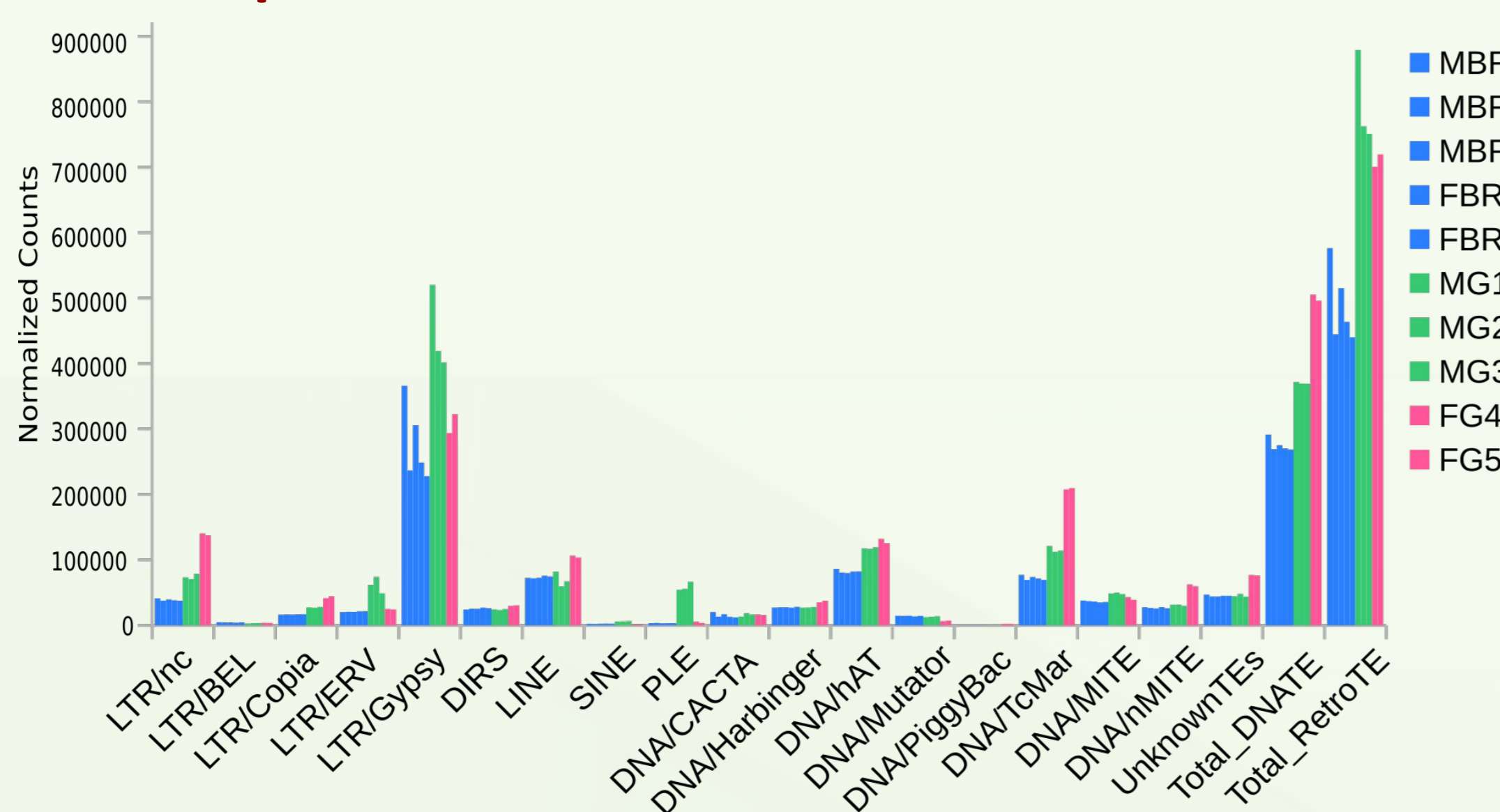


Fig 1. Expression levels of TEs in *B.pachypus*:

Total_RetroTE: total of all Retrotransposons (from LTR/nc to PLE families); Total_DNATE: total of all DNA transposons; MBR: male brain (blue), FBR: female brain (blue), MG: male gonad (green), FG: female gonad (pink).

Higher expression of TEs in the **germline**

Retrotransposons → the most active class in **MG**

DNA transposons → the most active class in **FG**

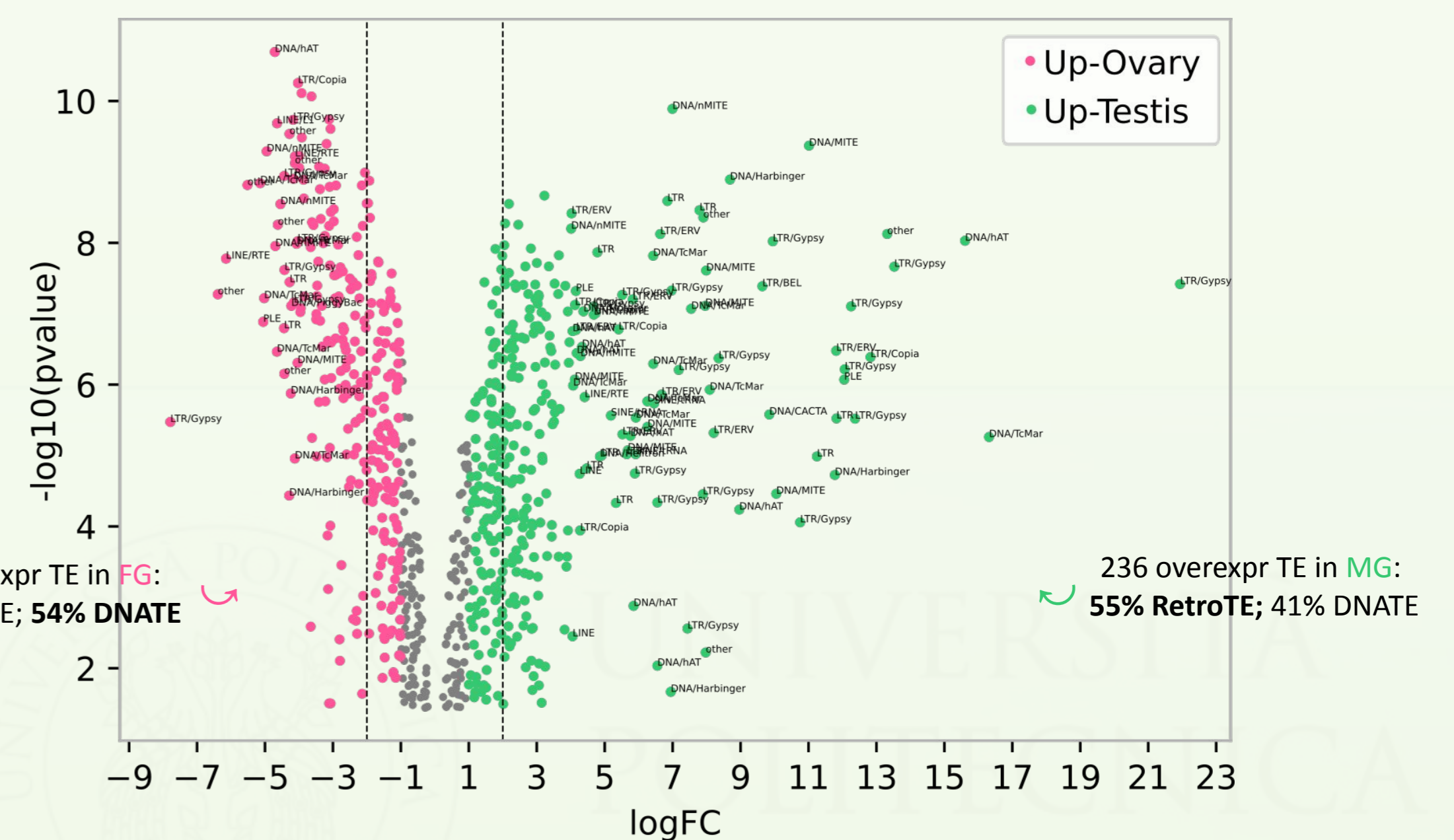


Fig 2. Volcano plot showing the up-regulated DE-TEs between female and male gonads: Overexpressed TEs in ovary (pink) and in testis (green). Dotted lines indicate logFC ±2

MALE GONADS:

- more overexpressed TEs
- higher fold changes

TE-Regulatory Gene Pathways Expression

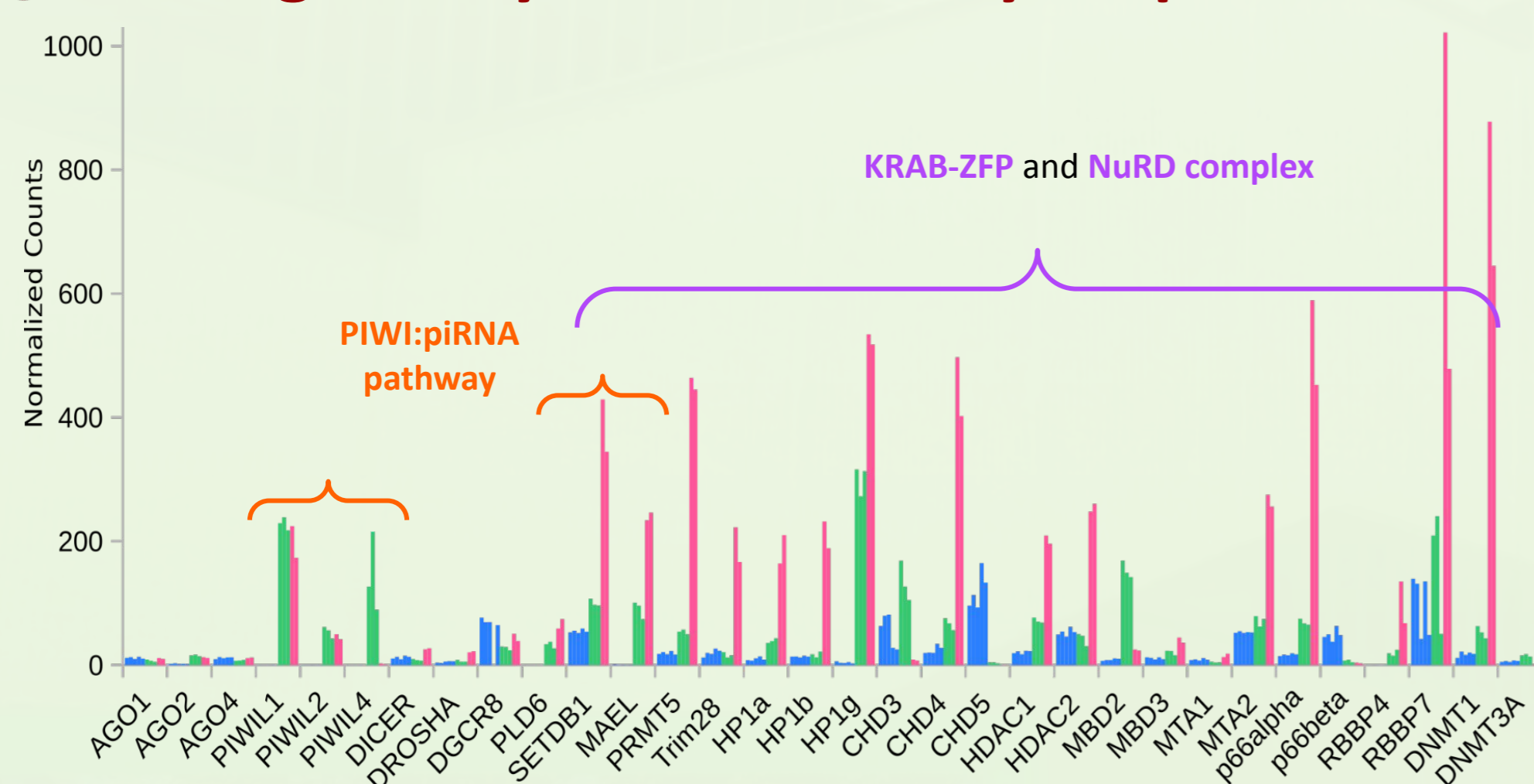


Fig 3. Expression levels of key genes involved in negative regulation of TE activity in *B.pachypus*: MBR: male brain (blue), FBR: female brain (blue), MG: male gonad (green), FG: female gonad (pink).

Tissue-specific strategies in the gonads:

- ★ Higher expression of **PIWI:piRNA pathway** in **male(MG)** and **female (FG)** gonads → related to involvement of these protein in the **Ping-Pong cycle** that requires ongoing expression of the cluster and target transposons
- ★ Higher expression of **KRAB-ZFP** and **NuRD complex** in **female gonad (FG)** which correlates with the **lower TE expression in FG**

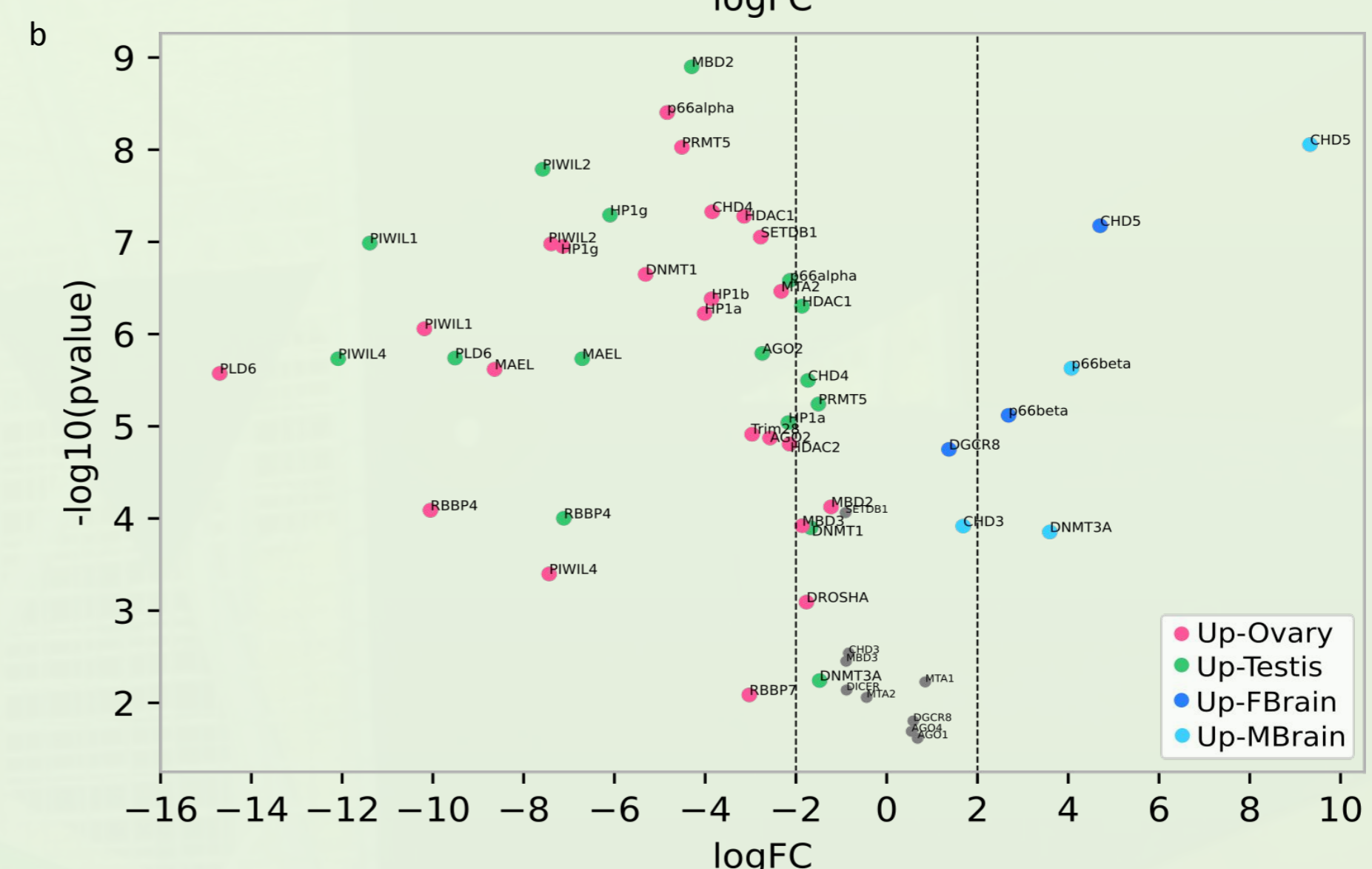
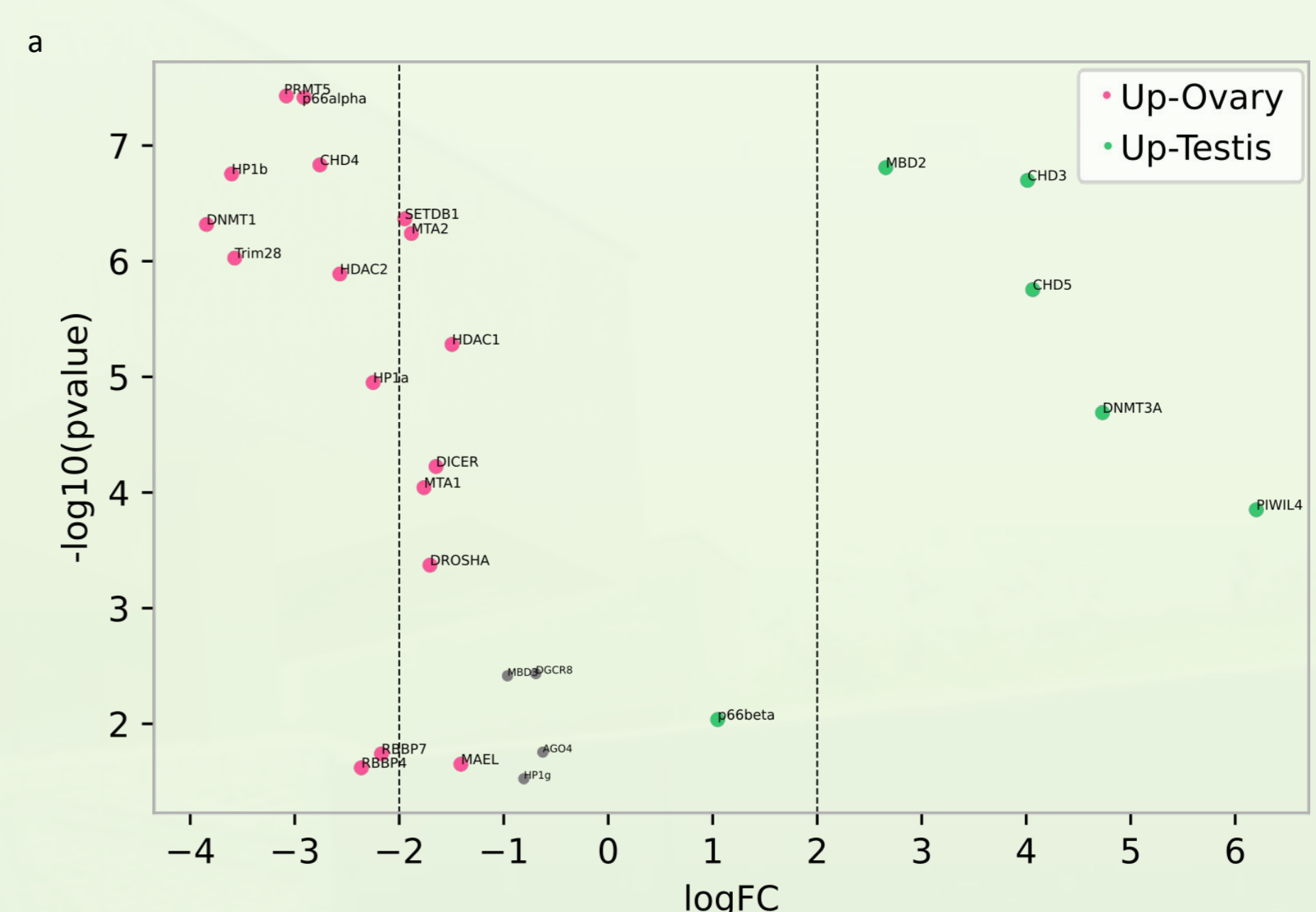


Fig 4. Volcano plots showing the up-regulated DEGs (TE-regulatory gene pathways) between female and male gonads (4a) and between gonads and brain (4b): Overexpressed DEGs in ovary (pink), testis (green), Female Brain (blue) and Male Brain (lightblue). Dotted lines indicate logFC ±2