




Non-canonical DNA in bird telomere-to-telomere genomes

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 Linnéa Smeds, Simona Secomandi, Chul Lee, Francesca Chiaromonte, Erich D. Jarvis,
 Giulio Formenti,  Kateryna D. Makova

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Linnéa Smeds

Doctor of Philosophy · Post Doc at Pennsylvania State University



Kateryna Makova, Ph.D.

Professor

Professor, Department of Biology

Director, Center for Medical Genomics



Erich Jarvis

Rockefeller University, Duke University, HHMI

Verified email at rockefeller.edu - [Homepage](#)

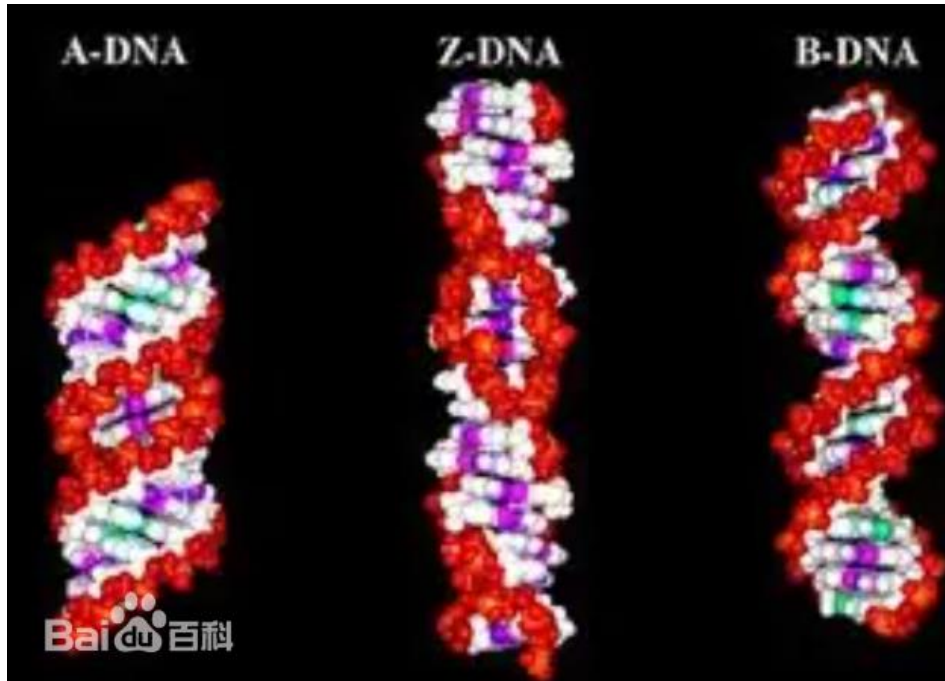
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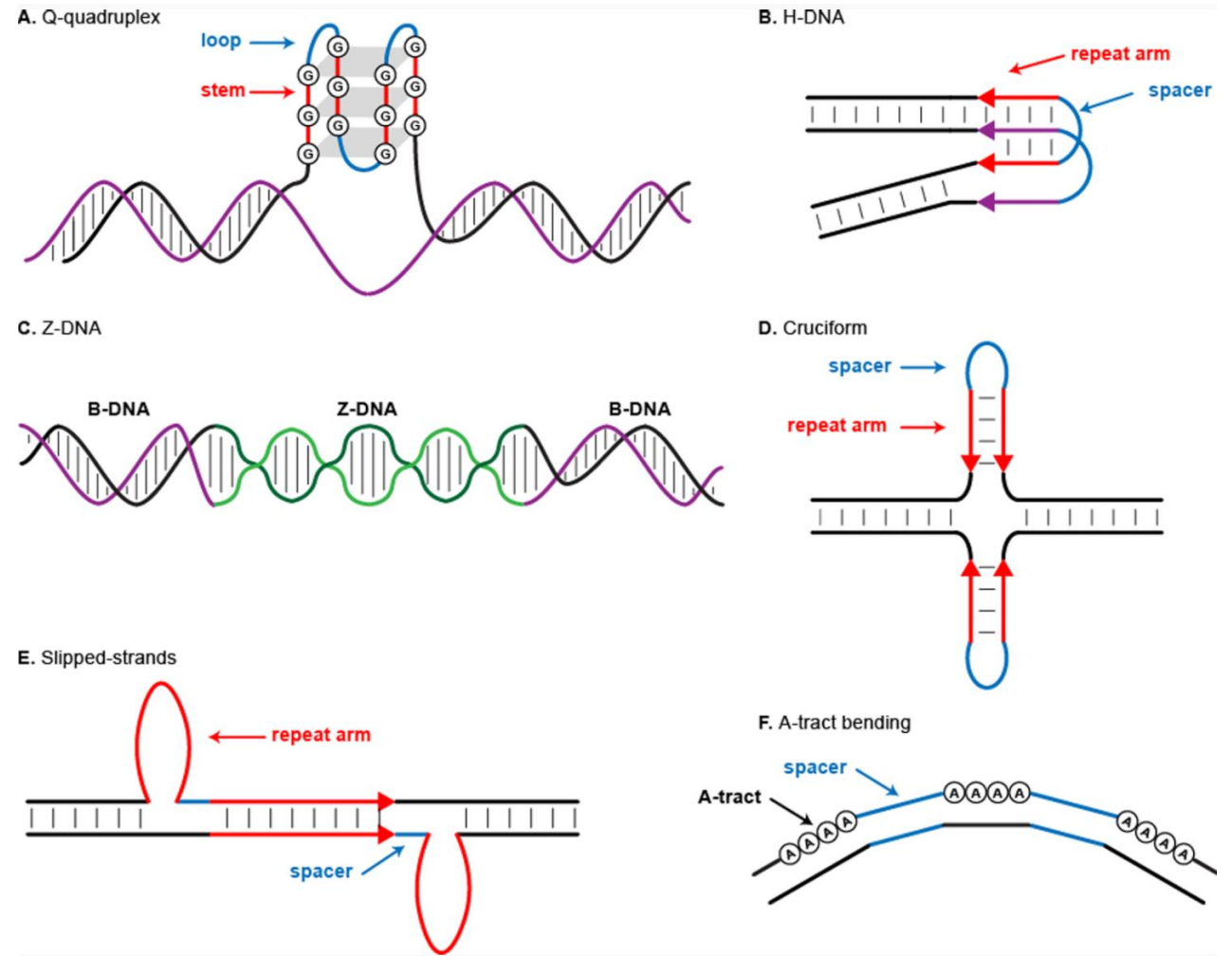
What's Non-canonical DNA?

DNA structures

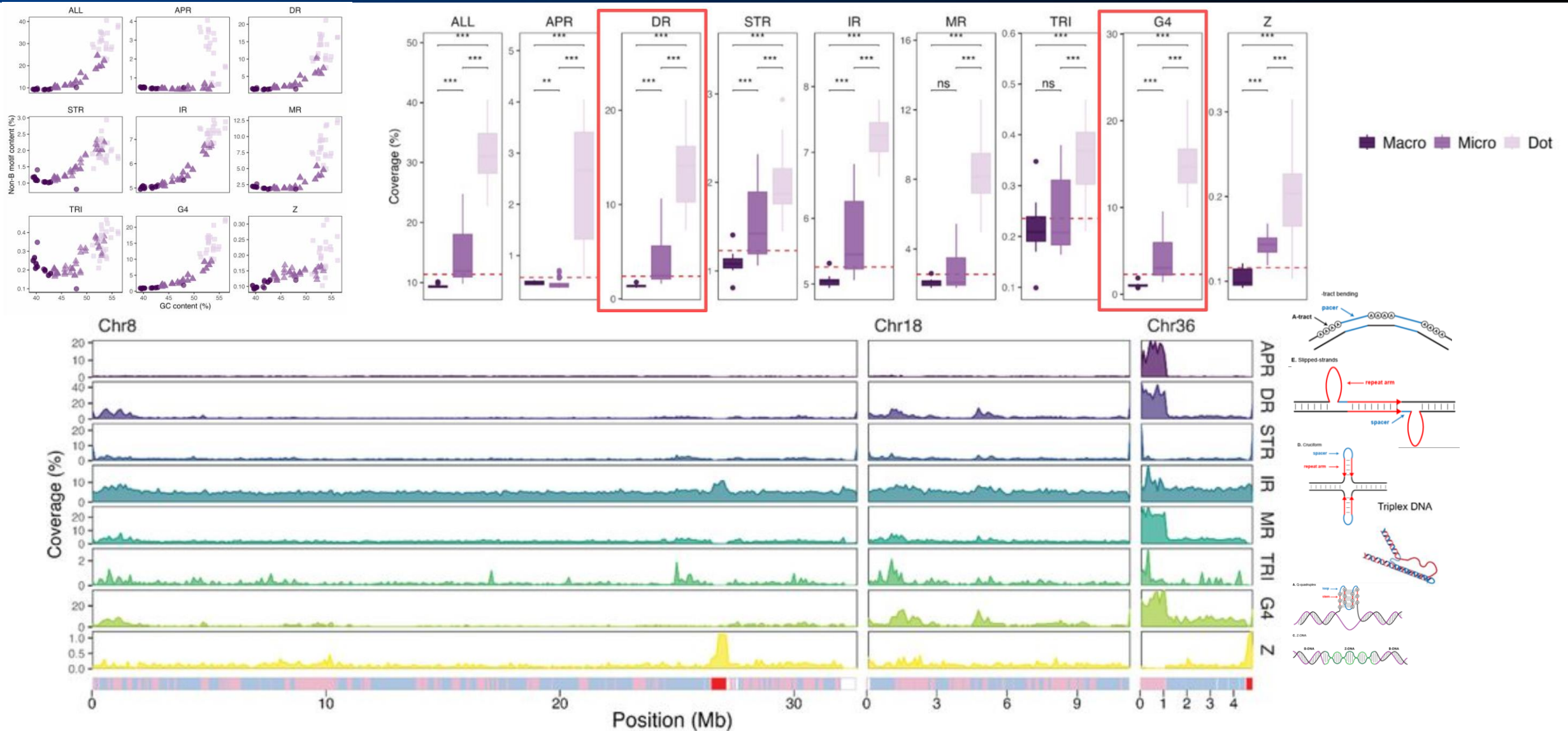


Hard to sequencing using short-read sequencing technologies

Non-canonical (non-B) DNA motifs



Genome Distribution of Non-B DNA motifs

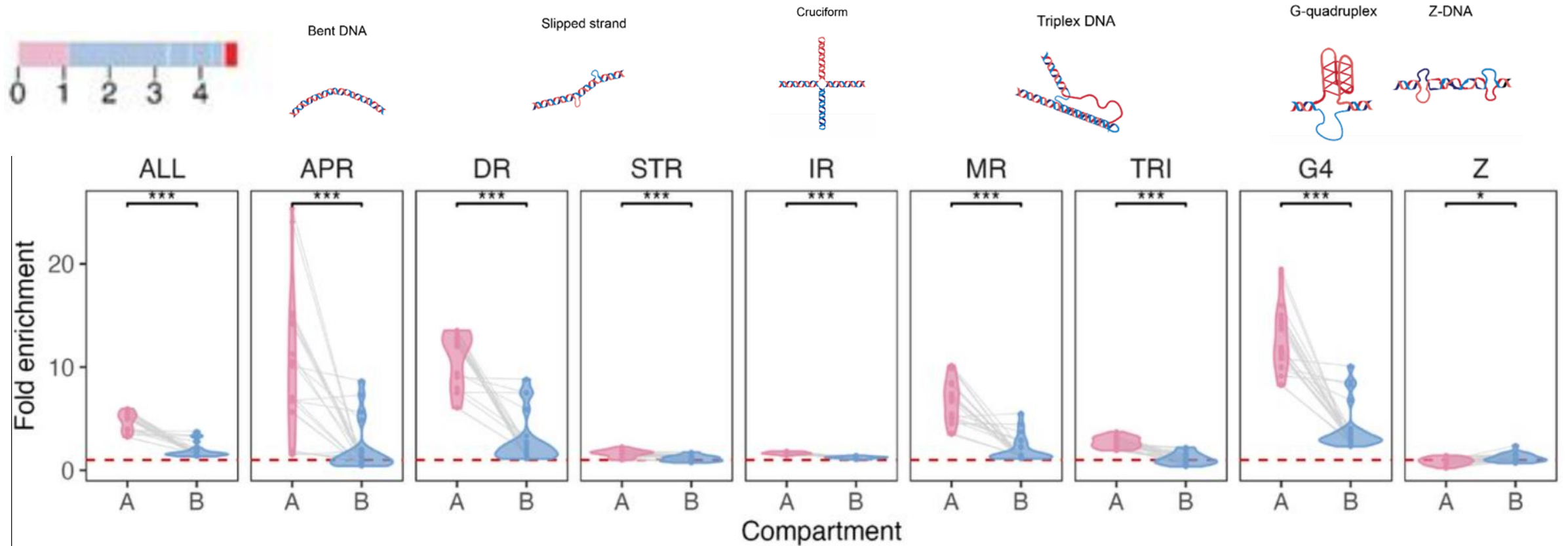


Dot chromosomes display a unique non-B DNA motif landscape

“A” euchromatic compartment

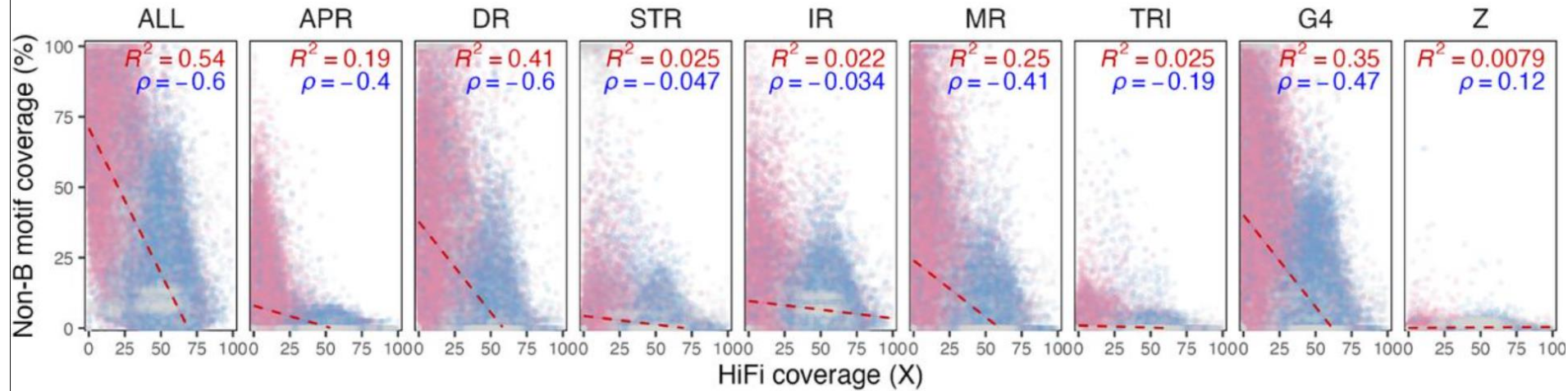
“B” heterochromatic compartment

*Red dashed lines represents the genome-wide average

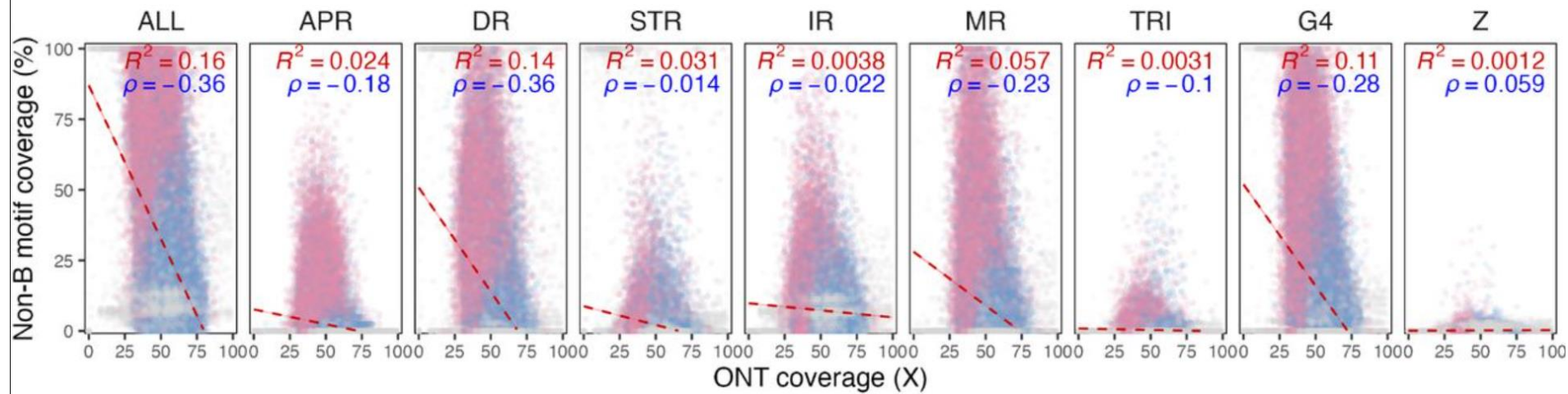


Dot chromosomes display a unique non-B DNA motif landscape

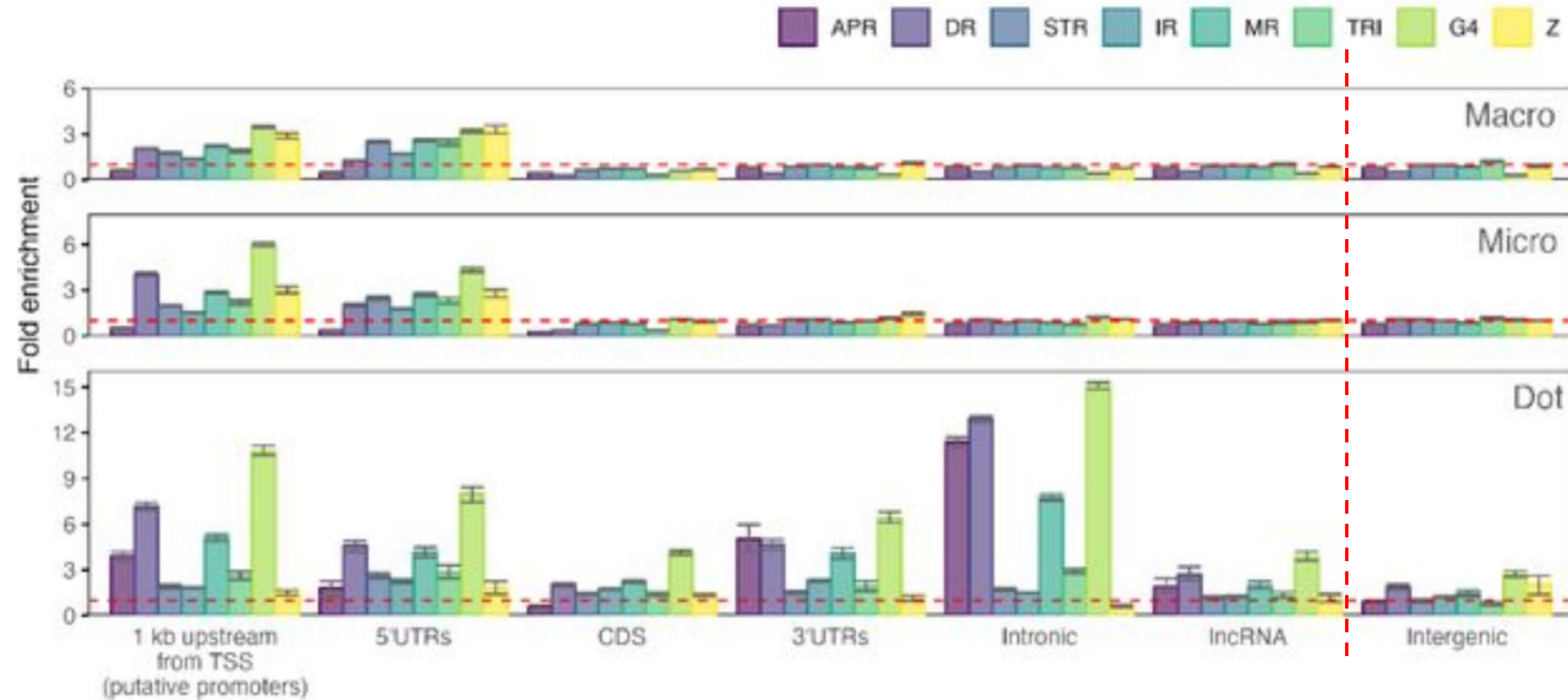
B



C

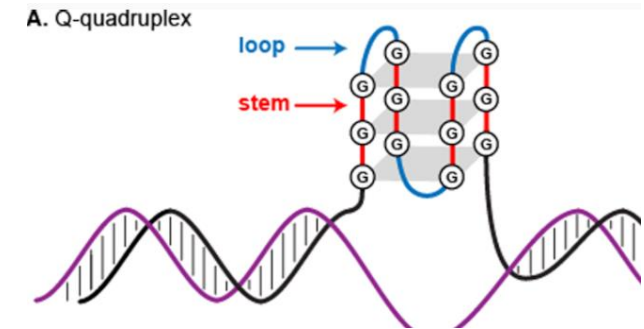
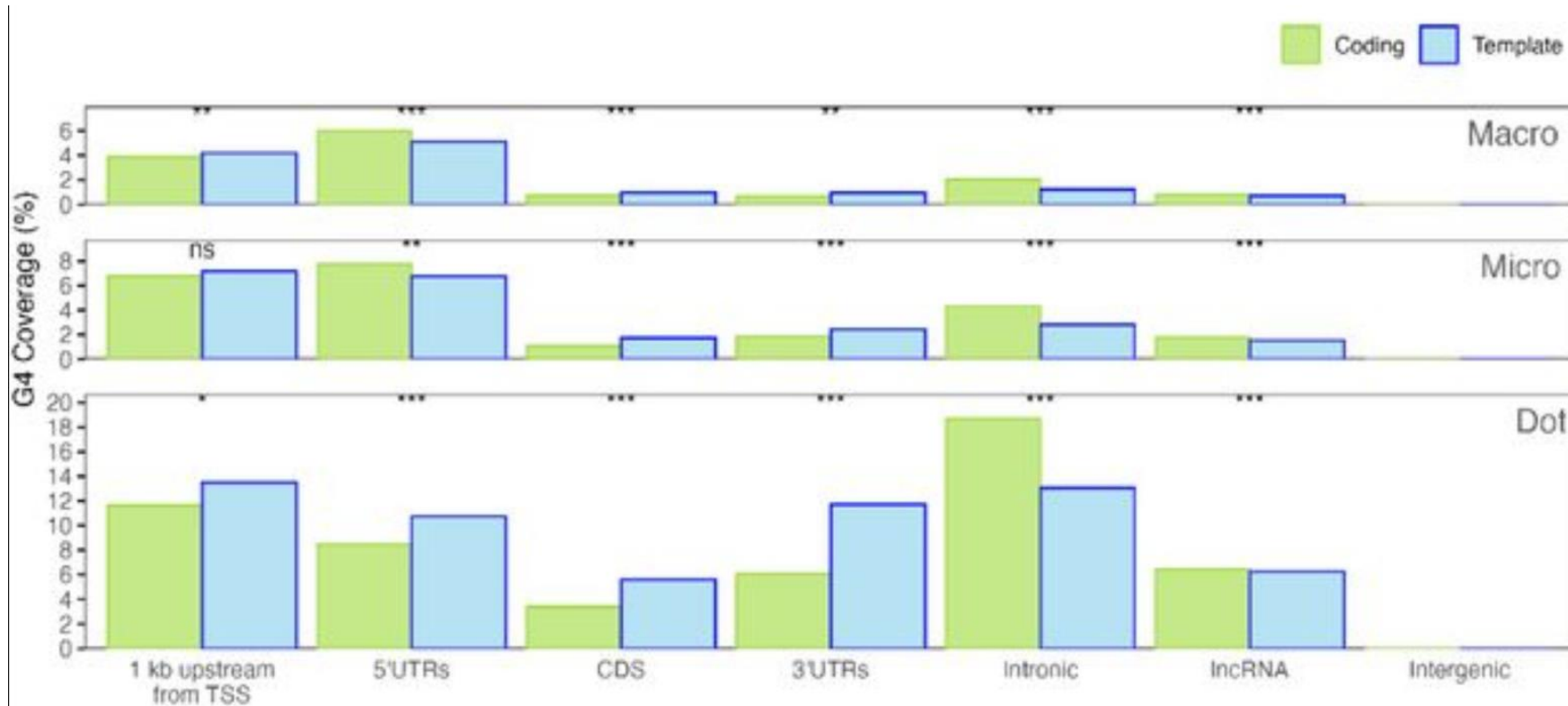


Non-B DNA sequences are enriched and fold at functional genomic regions

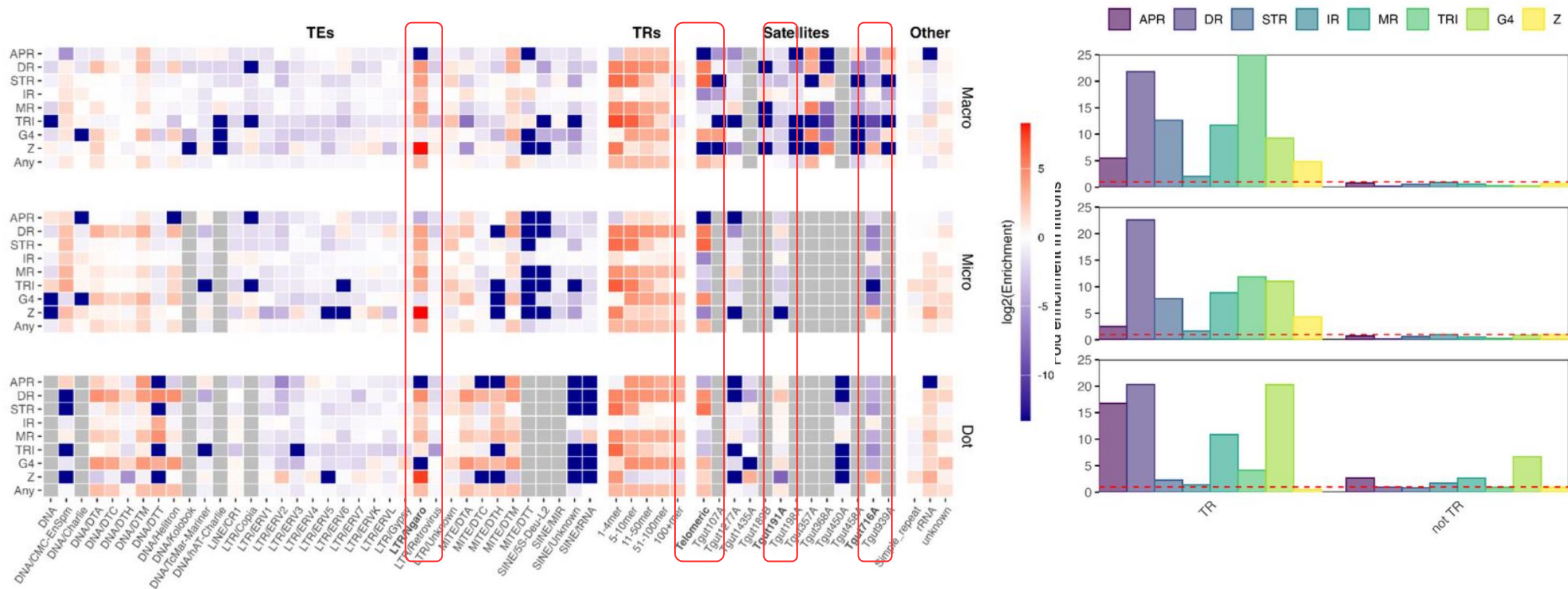


Non-B DNA sequences are enriched and fold at functional genomic regions

*intergenic regions are strand-ignorant, thus excluded



Overrepresented non-B DNA motifs at repeat classes



Ngao elements and telomeric and centromeric satellites

Conclusion

T2T assemblies reveal the "hidden" genome:

Complete avian genomes provide a high-resolution map of non-B DNA motifs, overcoming the gaps left by previous short-read technologies.

Structural density of non-B DNA motifs:

Non-B DNA motifs are significantly more enriched on dot chromosomes, A compartments, functional regions and repeat classes.

Function in regulatory anchors:

The high density of G4 structures at promoters and 5'UTRs suggests they are essential physical regulators of avian gene expression.

Discussion

- While it provides an incredible high-resolution map of where these motifs are, there is still a lack of **functional validation**
- The paper shows that chicken centromeres are enriched with **A-phased repeats**, while zebra finch centromeres favor **Z-DNA**. Interestingly, humans also show Z-DNA enrichment at their centromeres.
convergent evolution? Variation?