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INSTITUTE FOR SYSTEMS GENOMICS

SPECIAL SEMINAR:

Paul Flicek, DSc

Principal Scientific Investigator, The Jackson Laboratory



October 21, 2025

11:00am

ESB 121

Dr. Flicek became the inaugural Chief Data Science Officer at The Jackson Laboratory in 2023. He has held leadership positions in multiple large-scale genomics projects including Ensembl, the 1000 Genomes Project, the Global Alliance for Genomics and Health and the Earth BioGenome Project. He has co-authored over 280 scientific publications. He is also currently Honorary Professor of Genomics and Computational Biology at the University of Cambridge.

"Evolution of transcriptional regulation"

Mammals are characterised by diverse morphology and other features arising from a largely consistent set of genes. A significant fraction of these differences are assumed to derive from alterations in transcriptional regulation caused by species-specific enhancer and promoter usage. To gain insight into mammalian regulatory evolution, we generated genome wide maps of DNA binding proteins, enhancers and promoters as well as matched gene expression data in multiple tissues across a diverse collection of species. Our results describe a dynamic evolutionary landscape with rapid changes in regulatory element location over even short evolutionary time scales. We find that regulatory complexity (i.e. the number of regulatory elements) is the key driver of both transcriptional output and stability over evolutionary time. Key to both the rapid changes in the regulatory landscape and effect of regulatory complexity is the role of "recently evolved" regulatory regions which are not deeply shared across mammals. These regions are associated with transposable elements and may contribute significantly to species-specific phenotypes.

Our future plans focus on using biological data science to enable every larger data sets including those arising from biodiversity sequencing projects to understand genome biology and function.