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Linking replication and transcription

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There has been much speculation about the relationship between replication timing and gene expression in eukaryotes. In an Advanced Online Publication in *Nature Genetics*, Schübeler *et al.* describe how they used microarray hybridization experiments to construct a replication timing map for the entire *Drosophila melanogaster* genome (*Nature Genetics*, 30 September 2002, doi:10.1038/ng1005). They labeled *Drosophila* cell cultures with BrdU (bromodeoxyuridine triphosphate) and used flow cytometry to sort cells into different cell-cycle fractions. They then immunoprecipitated labeled DNA with anti-BrdU antibodies and PCR-amplified associated DNA fragments, before hybridization to DNA microarrays to compare material from early or late stages of S phase. They found that neighboring genomic regions were replicated at similar times during S phase. They processed the data to generate a genome-wide profile of replication. They found that pericentromeric heterochromatin replicates late in S phase. They compared gene-expression status and replication timing for over 40% of the fly genome and found a high correlation. These results contrast with a previous study in yeast, suggesting that the link between transcription and replication timing may be unique to higher eukaryotes.

References

1. The control of mammalian DNA replication: a brief history of space and timing.
2. *Nature Genetics*, [<http://www.nature.com/ng>]
3. Replication dynamics of the yeast genome.