CHROMOSOME BIOLOGY

Slicing up the centromere

Although centromeres are a defining feature of eukaryotic chromosomes, surprisingly little is known about how they are divided up into functional regions with distinct chromatin features. Now, the fission yeast *Schizosaccharomyces pombe* has come to the rescue: a recent study provides important clues to how centromeric regions are kept separate.

Kristin Scott and colleagues studied the area of transition between the central core region in *S. pombe* (which includes the kinetochore region) and its surrounding heterochromatin. Their approach was to look at the ability of the heterochromatin to spread and silence a reporter gene that is placed at different positions within the area of transition. This defined a stretch of 480 bp that prevents pericentromeric heterochromatin from encroaching on the core region, consistent with the presence of a specific barrier function.

Intriguingly, this 480-bp region contains a $tRNA^{Ala}$ gene, the deletion of which abolished the ability of the barrier to prevent transgene silencing. Consistent with a role of this gene in blocking the spread of heterochromatin, mutations in genes that encode components of pericentromeric heterochromatin alleviated transgene silencing in the presence of the $tRNA^{Ala}$ deletion. Removal of the $tRNA^{Ala}$ gene barrier also affects centromere function: spores that lacked this gene showed defects in chromosome segregation, indicating loss of kinetochore activity.

What features of the $tRNA^{Ala}$ gene are required for its barrier function? The authors showed that sequences that are needed for transcription of the gene by RNA polymerase III are essential for this activity. So, although not directly shown in this study, transcription of $tRNA^{Ala}$ might prevent heterochromatic spread, perhaps because the transcriptional complex physically blocks the machinery that assembles heterochromatin structures.

Although this and other possibilities remain to be investigated, using *S. pombe* promises to be a fruitful avenue for understanding the functional make-up of the centromere — and not only of yeast. The similarity between the chromatin domains of *S. pombe* and of higher eukaryotes means we could also learn something about the core of our own chromosomes.

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ORIGINAL RESEARCH PAPER Scott, K. C., Merrett, S. L. & Willard, H. F. A heterochromatin barrier partitions the fission yeast centromere into discrete chromatin domains. *Curr. Biol.* **16**, 119–129 (2006)