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Sequencing and analysis of megabase-sized genomic regions from wheat

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Our current knowledge of the wheat genome composition is limited to the analysis of small segments (120-150 kb). Using the physical map of chromosome 3B, we have selected and sequenced two large BAC contigs that cover the *Rph7* (3.0 Mbp, 8x coverage) and *Sr2* (1.8 Mbp, 6x coverage) loci on the short chromosomal arm.

The *Sr2* locus has a high content (~85%) of transposable elements (TEs) which were the main source of problems during assembly and finishing. Interestingly, most gaps were found in very narrow and specific regions of some TE families and not, as was expected, caused by mis-assembly of different repeat units. Genic regions were mostly covered evenly and posed no major problems in the finishing phase. This indicates that the gene-containing portions of the wheat genome will be relatively easy to obtain but a complete finishing of TE-rich regions will often be necessary to confirm the integrity of large BAC contigs.

In contrast, with less than 70% of TEs, the *Rph7* locus is more gene-rich. To date, 41 putative genes have been predicted, representing an average gene density of 1 gene/75 kb. A particular effort was made in the development of bioinformatics tools dedicated to scaffolding, annotation and the automated design of markers. Genetic to physical map comparisons reveal a strong variation of the recombination rate between the two loci. This study provides new insights into the composition of the wheat genome and promotes the development of efficient tools and methods for sequencing and annotation.