

Intragenic recombination between pseudogenes as a source of new disease specificity at a simple resistance locus

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The leaf rust resistance gene *Lr21*, coding for an NBS-LRR protein, was identified from the wild goat grass *Aegilops tauschii* Coss, the species that contributed the D-genome to bread wheat (*Triticum aestivum* L.). Unlike most NBS-LRR type resistance genes that are organized as compound loci, *Lr21* is located at a simple locus. We studied the molecular dynamics of this locus in samples of 25 *Ae. tauschii* accessions and 22 bread wheat cultivars, and discovered at least 13 nonfunctional *lr21* alleles existing as truncated expressing pseudogenes and one functional *Lr21* allele. The *Lr21* specificity arose most likely from two susceptible *lr21* alleles through intragenic recombination between the NBS and LRR domains. The discovery suggests plant resistance genes can be generated from the dead alleles. The birth of *Lr21* provides new understanding as to why plants keep and often transcribe truncated resistance gene analogs.

