Poster 19. A point mutation demonstrating the pleiotropic wffects of the somestication gene Q in hexaploid wheat.

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The *Q* gene is a major domestication gene in wheat because it confers the free-threshing character and pleiotropically influences many other domestication-related traits. The *Q* gene has been isolated and identified as a member of the APETALA2 (AP2) family of transcription factors. In this study, we created an ethyl methanesulfonate (EMS)-induced, *Q*-disrupted mutant in the *Triticum aestivum* subsp. *aestivum* cultivar Bobwhite (BW) to evaluate the function and pleiotropic effects of *Q*. Sequence analysis of the mutant revealed a point mutation within the first AP2 domain of the coding region. Relative quantitative (RQ)-PCR analysis indicated the level of *Q* transcription in the mutant was significantly reduced compared to the wild type. Comparison of wild-type BW and the mutant indicated that *Q* influences plant height, spike-emergence time, spike shape, rachis disarticulation, glume toughness, and threshability, which was consistent with previous reports. In addition, the *Q*-disrupted mutant also had fewer tillers and spikelets, which resulted in decreased yield compared to wild-type BW. Cell morphology observations of the rachis and glumes revealed major differences in cell shape, arrangement and density, and abscission zone formation between the mutant and the wild type, which provides explanations for the underlying biological differences in glume architecture and threshability. These results indicated that the mutation that gave rise to the *Q* gene not only allowed for the domestication of wheat, which contributed substantially to the rise of modern civilization, but it also contributed to increased yield and agronomic performance, further substantiating *Q* as a 'super' gene.