S012 The flavonoid biosynthesis pathway regulates endosperm development in *Arabidopsis*

Melissa Spielman, Sushma Tiwari, Ahmed Bolbol and Rod Scott

Biology and Biochemistry, University of Bath, BA2 7AY, Bath UK

Post-zygotic hybridization barriers are important in speciation and in plant breeding. Failure of endosperm development is frequently the most obvious cause. Crosses within a species involving parents of different ploidy levels (2× and 4×) also frequently fail, again due to abnormal endosperm development, suggesting a common mechanism operates. In most accessions of *Arabidopsis* the effect of such crosses is non-lethal parent-of-origin effects on endosperm size (Scott et al., 1998). However, the Columbia accession displays an asymmetric interploidy hybridization barrier – > 80% 2×X4× seed abort due to non-cellularisation of endosperm, whilst 4×X2× seed are viable. Substituting the maternal Col 2× parent with L*er* dramatically improves seed viability in 2×X4× cross. Genetic analysis showed that L*er* carries maternally expressed modifier genes that promote endosperm cellularisation (Dilkes et al., 2008), revealing communication between integuments and endosperm regulates endosperm development. Genetic variation at *TTG2* accounts for most of the rescue. *TTG2* is one of several transcription factors that regulate the flavonoid biosynthesis pathway (FBP) in the seed integuments. Loss of function mutants in FBP structural/regulatory genes lack the characteristic brown pigmentation of wild type seeds. Further genetic analysis suggests the FBP produces an intermediate that either directly blocks endosperm cellularisation, or blocks a temporally produced cellularisation-promoting signal. This provides new insights into the mechanism of integument-endosperm signalling.