S004 Molecular control of fertilization and interspecific hybridization

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Research in our laboratory focuses on the developmental genetics of plant reproduction, with an emphasis on cellular interactions during double fertilization. I will focus on the reception of the pollen tube by the synergid cells, where the pollen tube arrests growth and ruptures to release the sperm cells. We have isolated and characterized female gametophytic mutants that disrupt pollen tube reception. Pollen tubes that encounter such mutant female gametophytes are unable to rupture and release the sperm cells (Huck et al., *Development* 130:2149; Kessler et al., *Science* 330:968). These phenotypes suggest that the female gametophyte controls the behaviour of the male gametophyte (pollen) in this process. One of the mutants, *feronia,* was shown to affect a receptor-like kinase (Escobar-Restrepo et al., *Science* 317:656), while another, *nortia*, disrupts a seven-transmembrane-domain-protein similar to the powdery mildew resistance protein Mlo (Kessler et al., *Science* 330:968). The identification of additional components in this signal transduction cascade suggest the involvement of glycosylation in this recognition process. Furthermore, interspecific crosses between Brassicaceae can result in a similar phenotype, suggesting the cell-cell interactions during pollen tube reception may be involved in interspecific crossing barriers. Using genome-wide association studies, we have been able to identify a factor that plays a specific role in interspecific compatibility while intraspecific crosses are not affected. Thus, pollen tube reception may be involved in establishing crossing barriers essential to maintain species boundaries similar to sperm-egg interactions in animals.