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**Cover illustration:** The ScFRK2 MAP kinase kinase kinase from the Solanaceous plant *Solanum chacoense* (flower, top left and bottom left corners) is predominantly expressed in female and male reproductive tissues. It is already detectable in the megaspore mother cell in ovule primordium (top right circle), in mature ovules and, more strongly in fertilized ovules (*in situ*, below the flower). Overexpression of the *ScFRK2* gene leads to a homeotic conversion of ovules to carpelloid structures that terminates with stigma-like papillae. Overexpression of the *ScFRK2* gene also leads to reduced pollen viability and major structural defects. (See Gray-Mitsumune *et al.*, pp. 4171–4187.)