

## SEX DETERMINATION

## Polyploid paternity

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Sex is complicated. A number of different sexual systems have evolved, often multiple times, in different clades of life, based on an equally diverse array of genetic mechanisms. For diploid organisms, the use of sex chromosomes is a relatively simple approach, but Takashi Akagi of Kyoto University and colleagues have found that for the polyploid persimmon, simple genetics is not enough and epigenetics must lend a hand.

Fewer than 10% of plant species have distinct sexes. One of these is the date-plum (*Diospyros lotus*), individuals of which have exclusively male or female flowers. *D. lotus* is diploid with a single pair of sex chromosomes. Akagi *et al.* previously identified a gene (*OGI*) on the male-determining Y chromosome encoding small RNA molecules that suppress an autosomal gene, *MeGI*, which otherwise acts as a feminizing factor.

*D. lotus*'s close relative, the domesticated persimmon (*Diospyros kaki*), is hexaploid and has two sexual forms: trees only bearing female flowers, and trees with both male and female flowers. The researchers were surprised to find no expression of *OGI* in female-only trees, which are homozygous for the X chromosome, or in bisexual trees, which have at least one copy of the Y chromosome. Further investigation showed that the *OGI* gene of *D. kaki* is disrupted by the insertion of a transposable element. Instead, they found that repression of the *MeGI* gene was achieved by epigenetic methylation of its promoter.

The repression of the *OGI* gene in *D. kaki* by the transposon seems to allow a more flexible regulation of *MeGI*. This allows the production of female flowers on plants carrying the Y chromosome and also results in a specific pattern of male and female flowers in these trees. Flowers on shoots arising from wood that previously bore female flowers can be of either sex, but male-bearing branches almost never subsequently produce female flowers.

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