

Meiotic Silencing by Unpaired DNA:
Elucidation of a New Gene Silencing Pathway

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Abstract

Meiotic silencing by unpaired DNA is an RNAi-mediated pathway that functions to silence unpaired genes during the sexual phase of *Neurospora crassa*. The presence of a gene insertion or deletion causes an unpairing event during the homolog pairing stage. My dissertation's aim was to further characterize this new RNAi pathway.

First, I was involved in adapting the *in vivo* protein interaction technique Bimolecular Fluorescence Complementation (BiFC) to *N. crassa* to investigate SAD-1/SAD-2 interaction. SAD-1 and SAD-2 interact in the perinuclear region, suggesting that SAD-2 functions to bring SAD-1 to its proper location.

Next, I was involved in identifying components of quelling that also function in meiotic silencing. *dcl-1* and *qip* were found to be important for sexual development and meiotic silencing. DCL-1 and QIP also localize in the perinuclear region, implicating these genes in meiotic silencing.

Finally, I tested the mating type locus for immunity to meiotic silencing. Unpaired reporter gene insertions resulted in ascospore populations exhibiting partial protection from silencing. When a reporter gene was enclosed with paired *mat* locus flanks at an ectopic locus, partial protection was again observed.