**Table S1. Primers used in this study**

| Name | Sequence | Notes*,‡ |
|---|---|---|
| P229 | GCCGGCAGCTGCGTGGTAGAGGAAC | 1F |
| P228 | GTTTCGCAGTAGGGTTTGGTGAGGGTGGTC | 1R |
| P227 | TGACCAGAAGCGGACAAGACCAGAAC | 2F |
| P226 | GATGGAGCGGCGACAAGGGAGGGAC | 2R |
| P225 | CCGCCTGGCTATACGAAACCGACTCTG | 3F |
| P224 | AATGGTGTTGGTGATCGAAGGTGGAAAAG | 3R |
| P223 | TATCCGGTTCCGTTGCTCCATTCTCGTA | 4F |
| P222 | CCCCCGCCCTCGCTTCGCTATC | 4R |
| P221 | GCGGCCCCATCCCCAGCACTGTTTTGTAT | 5F |
| P220 | GTGCGGACTGCGGACGGAGCGACAT | 5R |
| P219 | CCTGCGCCACGACGACTGCCTCCTCAAC | 6F |
| P218 | GCCCAAAAATTTCACATCCCGCATCCAGT | 6R |
| P217 | CTCCGCGTTTTGTTCTTTTGCCGATGTTC | 7F |
| P216 | AGTCACCCCCATCCCACCACCTCTGTC | 7R |
| P238 | CCGTGGTGCCTTGTTTGCTTGCTCGCTCA | 8F |
| P239 | GGGCACATCCAATACAATAATCCTCCATA | 8R |
| P240 | CGGCGGGCCCAAGATCGATTTTCCTATT | 9F |
| P241 | CCGTTCCGTTCGTGCCACCATCATTGTTA | 9R |
| P242 | TACGAAGAGCTGAAATCAAACACATAAT | 10F |
| P243 | CGTCCCGGTCGATCCTTCAAACAG | 10R |
| P258 | GCCTCCATTTCGTCGAATCC | Universal *Mu*TIR |
| P292 | AGTATCTTGCGGGGCAGTG | R |
| F14 | AACCCTACTGCGAAACAACTGC | F |
| R15 | ATCAGGACGCAGGATTCTCG | R |
| *cyanase* | GCTGGTGAGGAGGAGAAACA | F |
| *cyanase* | CAGCAATCATGCCAGGTAGA | R |

*The first ten pairs of primers (1F-10R) were first used to identify the deletion in the *mac1-1* mutant.

‡Primers P222, P223 and P220, P223 were used for *mac1-1* genotyping, and primers P222, P223, P258 and P292 for *mac1-Y211* genotyping.

**Table S2. Independent segregation of *mac1* and *am1***

| Crosses and families* | Segregation fertile:sterile‡ | Cytology female meiosis in sterile plants§ | | | Total¶ |
|---|---|---|---|---|---|
| | | *mac1/mac1* | *am1/am1* | *mac1/mac1 am1/am1* | |
| 1. F2 (*am1-485*/+ × *mac1*+) | 28:17 | 7 | 8 | 1 | 16 |
| 2. F2 (*am1-1*/+ × *mac1*/+) | 28:17 | 7 | 3 | 3 | 13 |
| 3. F2 (*am1-2*/+ × *mac1*/+) | 32:18 | 8 | 3 | 1 | 12 |
| Total | 88:52 | 22 | 14 | 5 | 41 |
| $\chi^2$ | $\chi^2$ (9:7) = 2.47 | | | $\chi^2$ (3:3:1) =2.56 | |

*The individual crosses started from the heterozygotes of two mutants (*mac1*/+ × *am1*/+). The F1 plants were self-pollinated and F2 were studied. This experiment was carried out before molecular cloning of the *am1* and *mac1* genes. All genotypes were determined by genetic crosses.

‡Only F2 families segregating fertile and sterile plants with the expected ratio 9:7 were further analyzed. Meiotic phenotypes of all fertile plants were verified with aceto-carmine squashes of young anthers to confirm their normal meiosis.

§The sterile plants in these families were further investigated. Several ovules of each sterile plant were squashed, and megaspore mother cells (MMC) were isolated. The number of MMCs and the meiosis status were studied as previously described (Sheridan et al., 1996). Plants with single MMC per ovule showing the mitotic *am1-1* phenotype were grouped in the *am1* mutant class. Plants with multiple MMCs and regular meiosis were grouped in the *mac1* mutant class. Double mutant *am1; mac1* ovules exhibited both phenotypes as they contained multiple MMCs that conducted the aberrant *am1* meiocyte mitosis. The expected ratio of these three classes is 3:3:1.

¶Total numbers of sterile plants investigated by microscopic evaluation. The total $\chi^2$ values are shown in the last cell of the column.

**Table S3. Independent segregation of *mac1* and *afd1***

| Crosses and families* | Segregation fertile:sterile‡ | Cytology female meiosis in sterile plants§ | | | Total¶ |
|---|---|---|---|---|---|
| | | *mac1/mac1* | *afd1/afd1* | *mac1/mac1 afd1/afd1* | |
| 1. F2 (*afd1-1/+* × *mac1+*) | 31:32 | 12 | 17 | 3 | 32 |
| 2. F2 (*afd1-1/+* × *mac1+*) | 40:35 | 18 | 14 | 3 | 35 |
| Total | 71:67 | 30 | 31 | 6 | 67 |
| Expected if 9:3:3:1 | 77.6:60.4 | 25.9 | 25.9 | 8.6 | |
| $\chi^2$ (9:3:3:1) | 0.56 | 0.52 | 1.01 | 0.8 | 2.39 |

*The individual crosses started from heterozygotes of two mutants (*mac1/+* × *afd1/+*). The F1 plants were self-pollinated and F2 were studied. This experiment was carried out before molecular cloning of the *afd1* and *mac1* genes; therefore, all genotypes were determined by genetic crosses.

‡Only F2 families segregating fertile and sterile plants with the expected ratio 9:7 were further analyzed. The meiotic phenotype of all fertile plants was screened using aceto-carmine squashes of young anthers to confirm their normal meiosis.

§The sterile plants in these families were further investigated. Several ovules of each sterile plant were squashed, and megaspore mother cells (MMC) were isolated, counted and scored for meiotic characteristics previously described (Sheridan et al., 1996). Plants with a single MMC per ovule showing the *afd1* meiotic phenotype were grouped in the *afd1* mutant class. Plants with multiple MMCs and regular meiosis were grouped in the *mac1* mutant class. Double mutants, *afd1; mac1*, expressed both phenotypes as they contained multiple MMCs with the *afd1* meiotic defect. The expected ratio of these three classes is 3:3:1.

‡Total number of sterile plants investigated microscopically. The total $\chi^2$ values are shown in the last cell of the column.

**Table S4. Numbers of ovules, megaspore mother cells analyzed in six *mac1/mac1; afd1/afd1* double mutant plants**

| Family | Numbers of ovule examined | Megaspore mother cells (MMCs) | | Stages of meiosis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Average | Total | Inter-phase | L-P | Dia | M1-T1 | Dyad | Triad | Tetrad |
| 1-14 | 70 | 4.9 (2-9) | 340 | 11 | 276 | 3 | 26 | 23 | 1 | 0 |
| 1-26 | 45 | 7.1 (3-14) | 320 | 10 | 175 | 1 | 21 | 82 | 28 | 3 |
| 1-57 | 40 | 4.0 (2-8) | 159 | 4 | 121 | 1 | 6 | 26 | 1 | 0 |
| Subtotal | 155 | 5.3 (2-14) | 819 | 25 | 572 | 5 | 53 | 131 | 30 | 3 |
| 2-7 | 10 | 5.9 (4-10) | 59 | 1 | 15 | 9 | 4 | 21 | 2 | 7 |
| 2-15 | 5 | 6.0 (4-7) | 30 | 0 | 11 | 0 | 3 | 7 | 5 | 4 |
| 2-21 | 13 | 7.1 (4-10) | 93 | 4 | 59 | 6 | 9 | 11 | 1 | 3 |
| Subtotal | 28 | 6.5 (4-10) | 182 | 5 | 85 | 15 | 16 | 39 | 8 | 14 |
| **Total** | **183** | **5.5 (2-14)** | **1001** | **30** | **657** | **20** | **69** | **170** | **38** | **17** |

L-P, leptotene throughout oachytene; Dia, diakinesis; M1-T1, metaphase 1 throughout telophase 1.