

Supporting Information

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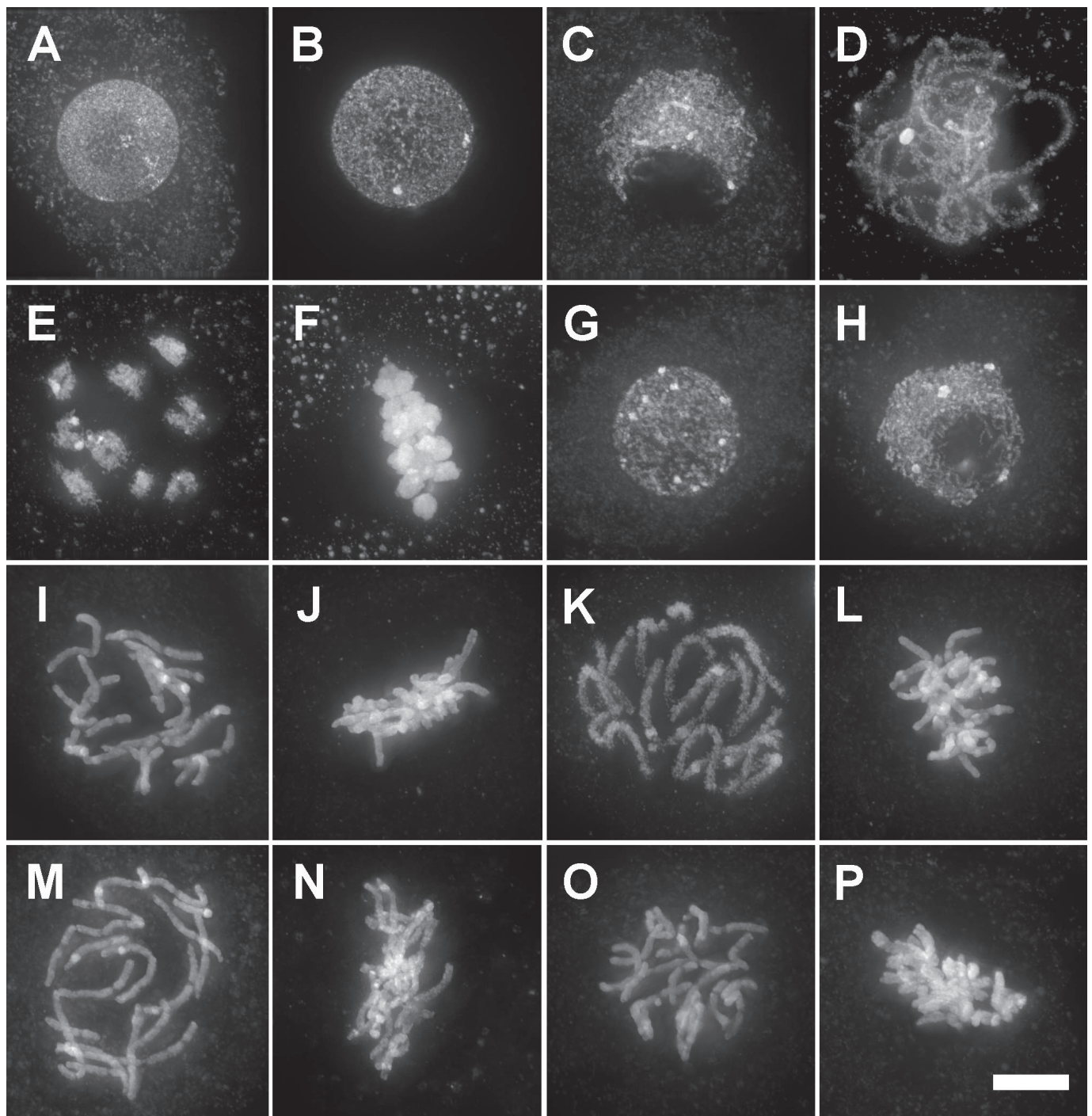


Fig. S1. Chromosome behavior in male meiocytes in wild-type maize and in the *am1* mutants. (A–F) Meiotic chromosomes in wild-type meiocytes: (A) premeiotic interphase, (B) leptotene, (C) zygotene, (D) pachytene, (E) diakinase, (F) metaphase I. (G and H) Meiotic chromosomes in the *am1-pral* mutant: (G) leptotene, (H) leptotene–zygotene transition. (I–P) Mitotic chromosomes in *am1* mutants: (I) prophase in *am1-1*, (J) metaphase in *am1-1*, (K) prophase in *am1-2*, (L) metaphase in *am1-2*, (M) prophase in *am1-485*, (N) metaphase in *am1-485*, (O) prophase in *am1-489*, (P) metaphase in *am1-489*. Chromosomes were stained with DAPI. (Scale bar, 10 μm .)

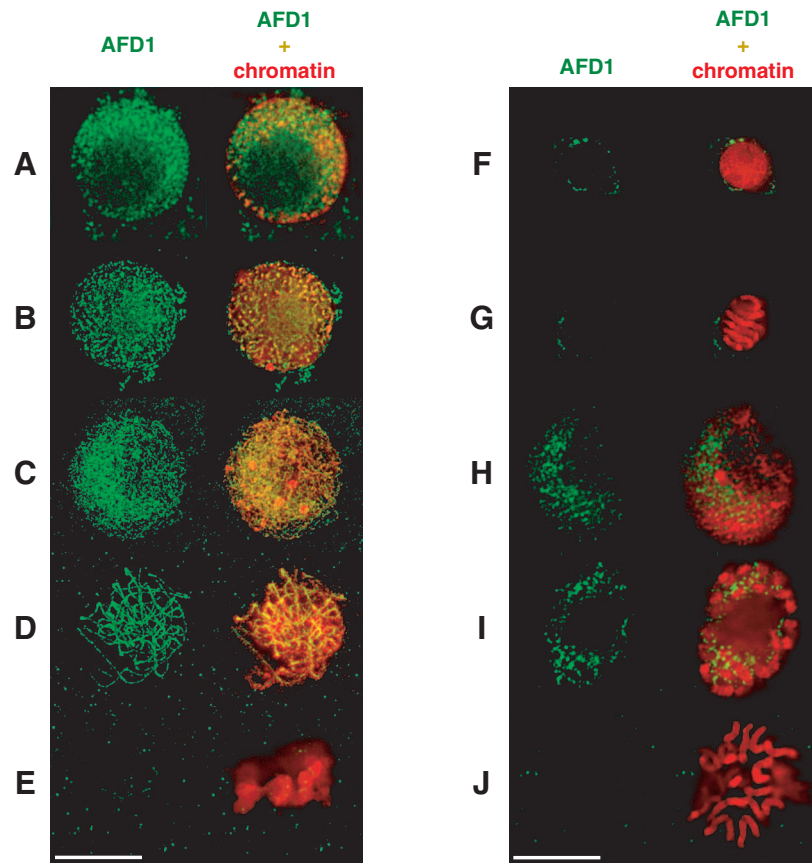


Fig. S2. AFD1 localization pattern in wild-type maize plants. (A–E) Meiosis: (A) premeiotic interphase, (B) leptotene, (C) zygotene, (D) pachytene, (E) metaphase I. (F–J) Mitosis: (F) anther tapetal cell in interphase, (G) anther tapetal cell in prophase, (H) root meristem cell in interphase, (I) root meristem cell in prophase, (J) root meristem cell in metaphase. Red: chromatin; green: AFD1. (Scale bars, 10 μ m.)

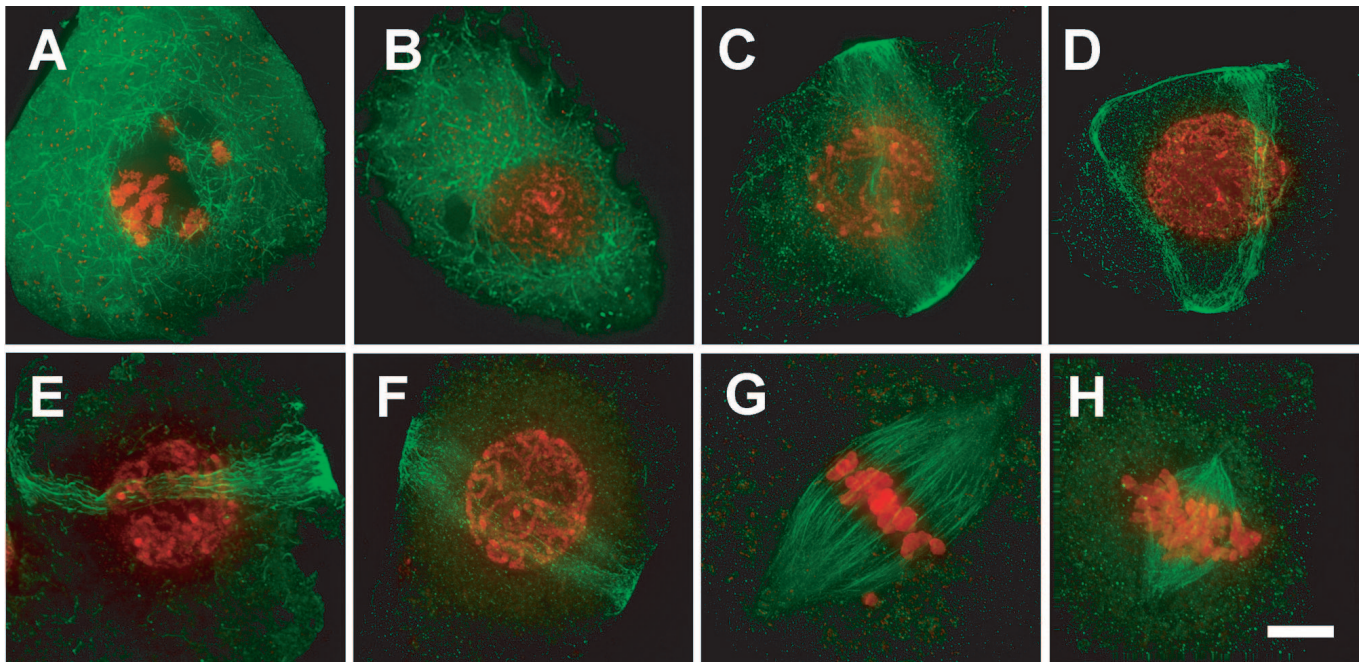


Fig. S3. Immunolocalization of microtubules in wild-type and *am1* mutant male meiocytes. (A–F) Microtubules in prophase meiocytes in wild-type maize (A), *am1-pral* (B), *am1-1* (C), *am1-2* (D), *am1-485* (E), and *am1-489* (F). A mitotic preprophase band is present in *am1-1*, *am1-2*, *am1-485*, and *am1-489* meiocytes, whereas it is absent from wild-type and *am1-pral* meiocytes. (G and H) Metaphase microtubules in wild-type (G) and *am1-489* (H) meiocytes. Meiocytes in *am1-489*, as well as in *am1-1*, *am1-2*, and *am1-485*, have short mitotic spindles, whereas long, focused spindles are present in wild-type meiocytes. Red: chromatin; green: tubulin. (Scale bar, 10 μm .)


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1
Zm: AME1IOTIC1
Zm: AC194609.2-FGP029
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MSACGGTIPASRFLRR--RAAVRDLGGDAAGDTDAFWAAPRLYD
MFVKRNPTRBTAGKISSPSS

100
Zm: AME1IOTIC1
Zm: AC194609.2-FGP029
At: SWITCH1-L
STIQPRSPLSRQSLTFDAIPYHAGAFYIDHDKLPPKSPIHLKSIKRVV
FSQQQQOQHTAQAAARRSPAPTSPELLARKRHQSPSPSP--SPRRSP
PTLN-----VAVAHIRAGSYEIDASILPQRSFENLKSIRVVM

150
Zm: AME1IOTIC1
Zm: AC194609.2-FGP029
At: SWITCH1-L
VSECTNLDITVFKPSSLQALRSFFSS-----YPAPGTGPELDERF
SSPGTCLLSALHRTCVGWGVTERRAE-----YPRRHRFPVSPAACG
SKITASDVSLRYPSMFLSRSHFDYSRMNRNPKMKKRSGGGLLPVFDESH

200
Zm: AME1IOTIC1
Zm: AC194609.2-FGP029
At: SWITCH1-L
At: AT5G23610
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QVTGMHTHGRAARCVDEEESTSKNS-----KC
VMASELAGDLLYRRIAPHELSMNRNSWGFVWSSS-----SRRNKFPREV
MSPPLREKTLAAIYN-----LKRKRSDKKI

250
Zm: AME1IOTIC1
Zm: AC194609.2-FGP029
At: SWITCH1-L
At: AT5G23610
CLPPPPAPPAATLGLTADSCLLTTLKCDGAGWGMRRRVYIGRHRDEAPK
LLAVGKNELEBEVQDHESECLHRRRAKAPWAVKEEOSTSCEAAEBGAK
VSCPAYNTRL CRAASPEGKCSSELKSGGMIKWRRRLRVQYQSRHIDTRKN
CRKEPNDSAMAAGP-----VVIKRETDTPG

300
Zm: AME1IOTIC1
Zm: AC194609.2-FGP029
At: SWITCH1-L
At: AT5G23610
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RAKRTPLKHEAAAAESKPAGAAATATP-----DSGSPRNGK--
KEGESSRVKDEVYKEEEMEKEEDDDGNEIGGTQKEAKEITNGNRKRKL
EE-EEGNTSRDNALVEVKLEKQEBLGLLVTCGIQKR--KRLARGARSR--

350
Zm: AME1IOTIC1
Zm: AC194609.2-FGP029
At: SWITCH1-L
At: AT5G23610
At: AT2G01810.1: AA373-AA431
At: MALE STERILITY1: AA326-AA403
At: MALE MEIOCYTE DEATH1: AA341-AA399
Os: PHD-finger protein: AA382-AA433
EGKKNKQVQGASKKISKAKKRTVESKDGDPRHGKDEWSAERYAAAEKSL
-----VDRWAAWRYAAGEAAL
IESSTERLAQKAKVYDQKQETQIVVYKRKSERKFI DRWSVERYKLABRM
-----RYSDTSFEEKPIIIPPKHKQQRVLTTRWNNERIKFAEQTL
RWPGRRLNDAQAQV
RWSQKRIQMAIKVV
RWPVRLIFAAEVI
RWSKRLLDAAEVV

400
Zm: AME1IOTIC1
Zm: AC194609.2-FGP029
At: SWITCH1-L
At: AT5G23610
At: AT2G01810.1: AA373-AA429
At: MALE STERILITY1: AA326-AA403
At: MALE MEIOCYTE DEATH1: AA341-AA399
Os: PHD-finger protein: AA382-AA428
LNIMSRDARFGAPVMFOVLEEEARKHIGDTGLLDHLKHMAGRVPESGV
ANILRERCATAGNPTPRAVLRPAQARRFSDTGLLDNLRHVADKVPAGTA
LKVMEKNAVFGNSILRPELSEARKLIGDTGLLDHLKHMAGKVPAGGO
ADIMKEKATFEKPVTRQLRVIARSKIIGDTGLLDHSLKHMKGKVPGGG
LKVFKERNST---ISRODLREAVRSSIGDTGLIDPLKHKID-KVLIG
IESLKRVEYRW---ISROEVRDAARNYIGDTGLLDPVLSKLGNOVVGNYL
VESLKEMKALQONGMTRQDVRDSARLHIGDTGLLDVVLKSMNNV
VDRLLEHSGSAAE-MTRQAVRDAARGAIGDTGLLD

450
Zm: AME1IOTIC1
Zm: AC194609.2-FGP029
At: SWITCH1-L
At: AT5G23610
At: MALE STERILITY1: AA326-AA403
HRFRRRHNADGMEYWLEPAELAEVVRKQAGVSDPYVPPPGWPKGDDVSL
DRVRRRYNPAQGMETWIEPAGLAAARREAGVEDTYVPPPGWPKGDDVSP
DRFMRKHNADGMEYWLESSELIHIRKEAGVKDPYTPPPGKGLGDNP--
DRFRRCYNTDGCQYVLESADLVKIKLESGLPDPYVPPAWMVMQVTA--
VR-RSLNPFVKVLEYSELE

500
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Zm: AC194609.2-FGP029
At: SWITCH1-L
At: AT5G23610
VAGDILVKRQVEELTEEVNGVKRQMEQLLCKDDGDFGAERDYSSLKEKYQ
EARTLEVQKQVEVLAGEBLAVVKRQMEQLDSN--LVQMSKEAYISWKGYD
-SQDPVCAGEIRDIREELASLRELKLLASKE-----
--SHDQSAVTSKLLMGHEIQMSEIKEIVSKQLNLPDHADAN-----

550
Zm: AME1IOTIC1
Zm: AC194609.2-FGP029
At: SWITCH1-L
At: AT5G23610
RAVRANEKLEKQVLCCLKMNCENVVQNGELKKEVSFAFKEKYEHIADKNDK
CMVKANGKLEKEVLSLEEKYETAAQVNGELKELLLLKDKYDVTLEKNEK
-----EELVIMTTPNSCVTSQ--DNLMTPAKEIYADLLKKKYK
-----EKLKELKSWRENTDKQIVEISELSTQGMFKELNSWKDK

600
Zm: AME1IOTIC1
Zm: AC194609.2-FGP029
At: SWITCH1-L
At: AT5G23610
LEEQVTVLSSSFLSKDQLVVA-----LKLELAPSEAVPR-----TA
LEGQVVALSTSFQSMKEBELLQRMEEHPLMLAQEPEWBDKREAGGANKA
IEDQLVITIGETLRKMEDEMGWL-----KKTVDENYPKKPD-----ST
VDQQLLGISNTLSNLQPNGSTS-----FSPAQENWEHILK-----TS

650
Zm: AME1IOTIC1
Zm: AC194609.2-FGP029
At: SWITCH1-L
At: AT5G23610
LFVASGEO--MTGTVIQGQODRAERKSSFRVCKPQKFLLPMSASGMTIG
LVVCAGDQ--LAGADAFDG--SFSSNHSAYGDEKMLRKRICVREGACQWP
ETPLLED--SPPIQTEGEVVKVNGNQITESPQ-----NREKGRKHD
NLEDFTTNGFDQWDDLIDGLPEAVRPETYALPTNPCKS--SLQDQSLIS

700
Zm: AME1IOTIC1
Zm: AC194609.2-FGP029
At: SWITCH1-L
At: AT5G23610
RGASSTCPAAATPGPGIPRSTSFPSMPGLPRSSRPVEVVAASGLDRHV
RSATSSGATAGSPG--DLPELTPGADLIVTDFDTMIDSLALPSMEVYL
QERRSPLSLISNTGFRICRPVGMFAWPQLP-----ALAAATDINAQSP
LQDQSLVSLQDQSLVNVDMQMTESMTRGESR-----SSSQEKAMTTPGS

750
Zm: AME1IOTIC1
Zm: AC194609.2-FGP029
At: SWITCH1-L
At: AT5G23610
MFGAHFSTPPSASSTNDAKQLSLSPSPRSLQPOKLFDTVTAASGFSP
QVDG-LPTPTSASSTASPKLQL-LPSPASPSQVQLPSTTMVVG----
SHRQAYPSFPVKPLAAKRPGLTFFPTTIIPPEAPKNLFNV
SITAGPKSDIDDDPTIQTQETLEKELVTWKAKAEQQLMELNAVLALKGQNG

800
Zm: AME1IOTIC1
Zm: AC194609.2-FGP029
At: SWITCH1-L
At: AT5G23610
QKLMHFSGLTRRDVDTSSSSGACGSGLLEKGRVLPDADAGGISAVGTTEL
---DFNQLRHMDTSSSSSGPCG---AKALKLDAGAGGG-EVGTTEL
PNWRYP

801
Zm: AME1IOTIC1
Zm: AC194609.2-FGP029
ALATPSYC
VLATPTY

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Fig. 54. Alignment of full-length sequences of AM1 and SW1/DYAD homologues from maize (*Zm*) and *Arabidopsis* (*At*). Shared residues are shaded. Also included are fragments of *Arabidopsis* and rice (*Os*) proteins that show similarity to the conserved central region of AM1/SW1, with shaded residues that are shared with the AM1/SW1 consensus. The red box indicates the position of the amino acid substitution in the *am1-pral* allele.

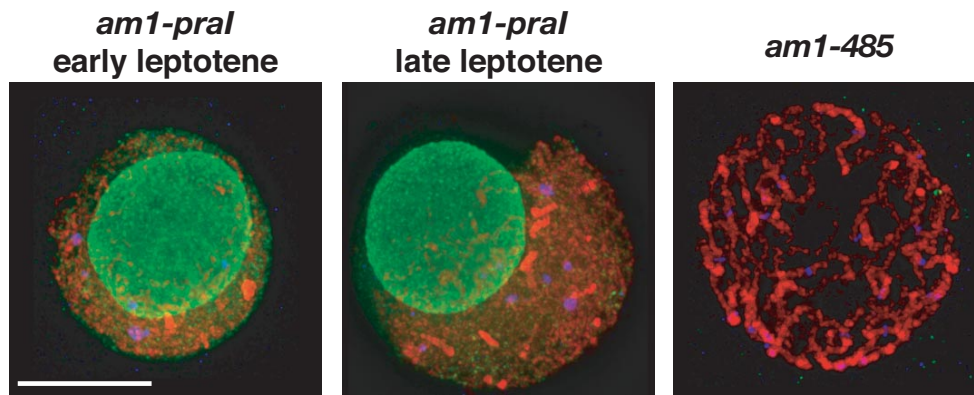


Fig. S5. Immunolocalization of the AM1 protein in male meiocytes of *am1* mutants. Red: DAPI-stained chromatin; green: AM1; blue: CENPC, a constitutive component of the inner kinetochore and marks centromeres. (Scale bar = 10 μm .)