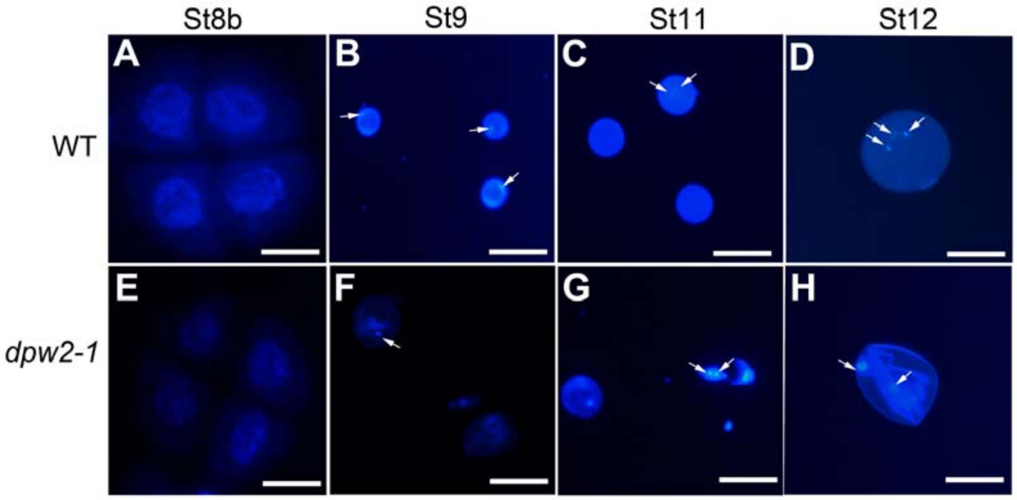
# Supplemental materials

## Supplemental Figures

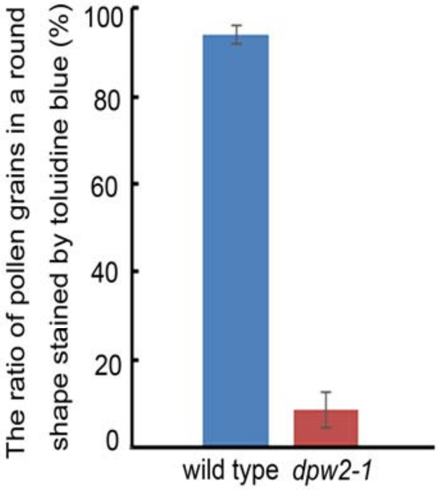


**Supplemental Figure 1.** DAPI staining of *dpw2-1* microspores.

(A) to (D) wild-type microspores.

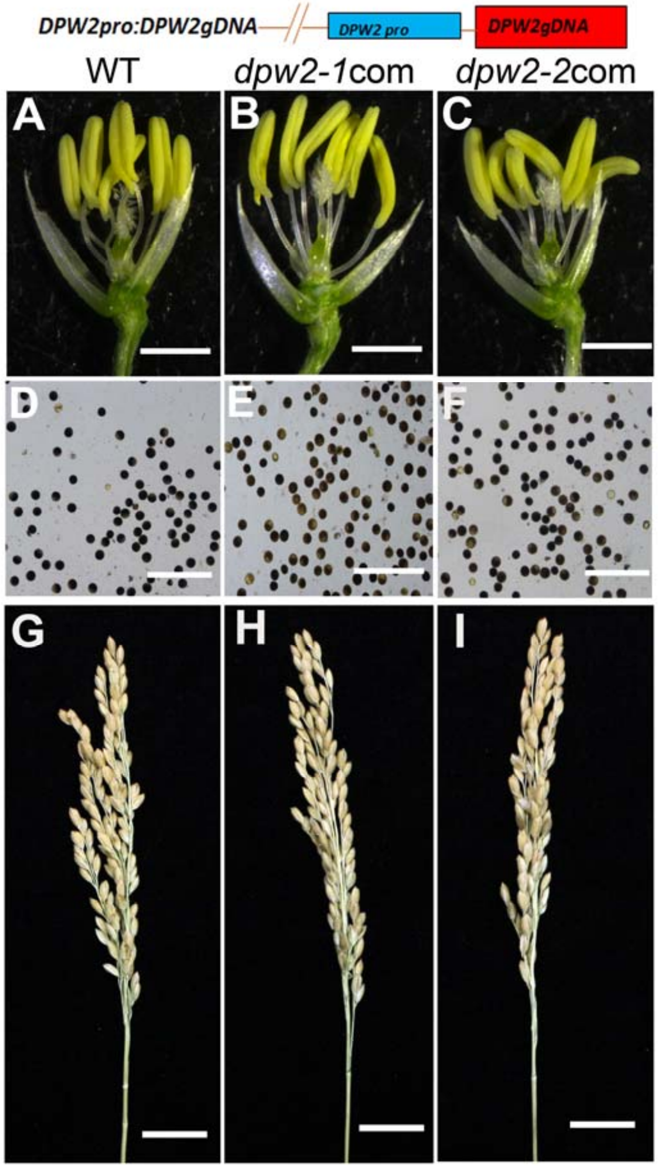
(E) to (H) *dpw2-1* mutant mrospores.

Arrows indicate the nucleus. There is one nucleus at stage 9 (B), two nuclei at stage 11 (C), and three nuclei at stage 12 (D) in the wild-type. In contrast, *dpw2-1* does not form microspores with three obvious nuclei (H). Bars = 10 µm.



**Supplemental Figure 2.** The ratio of pollen grains in a normal round shape in the semi-thin section of WT and *dpw2-1* mutant at heading stage.

Error bars indicate SD of the ratio of stained pollen grains from five independent sections.



**Supplemental Figure 3.** Complementation of *dpw2-1* and *dpw2-2* mutants by *DPW2* genomic DNA.

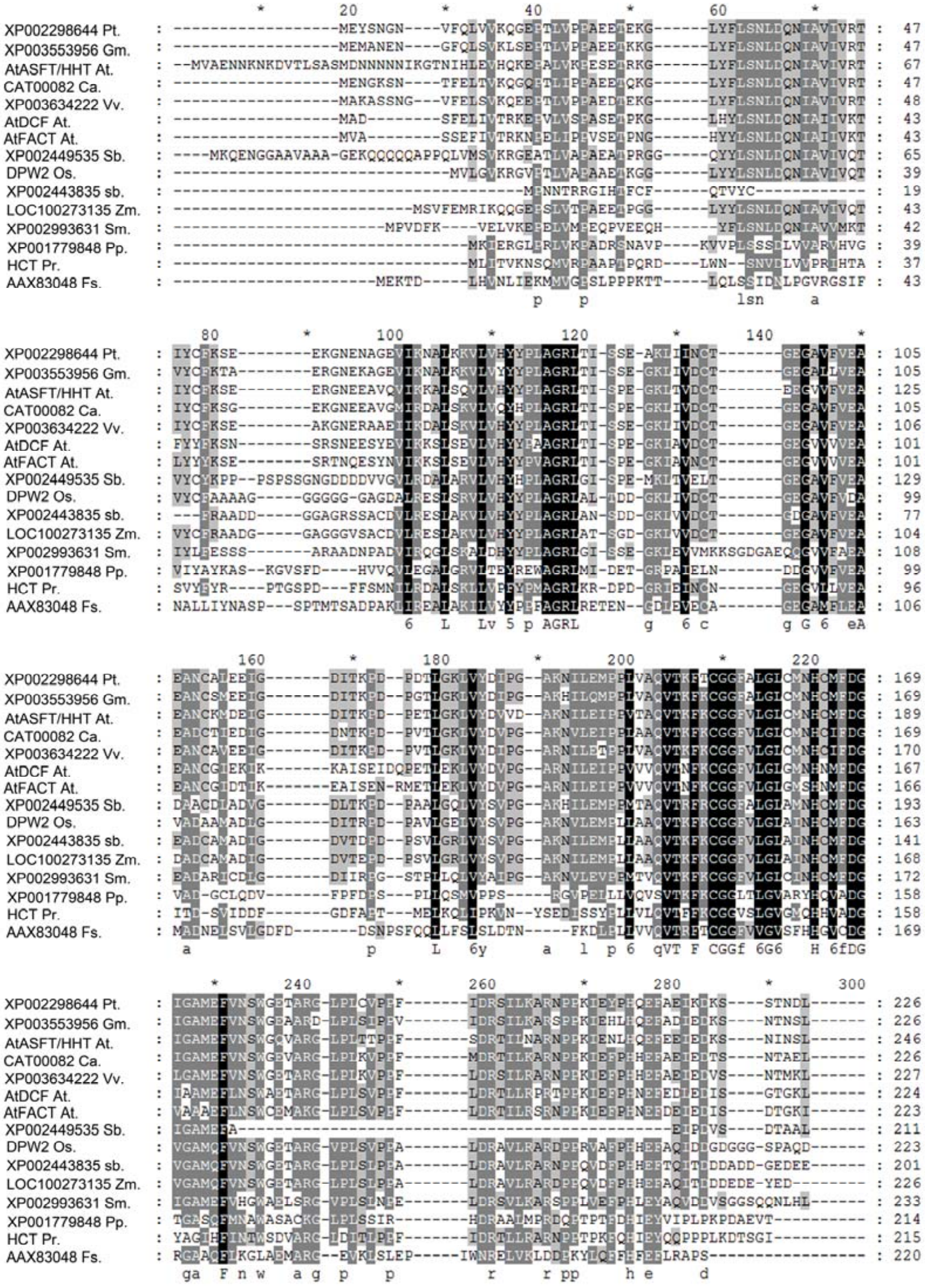
(A) to (C) stage-12 flower from WT (A), *dpw2-1* complemented with the ~4.34-kb wild-type genomic fragment (B), and *dpw2-2* complemented with the ~4.34-kb wild-type genomic fragment (C).

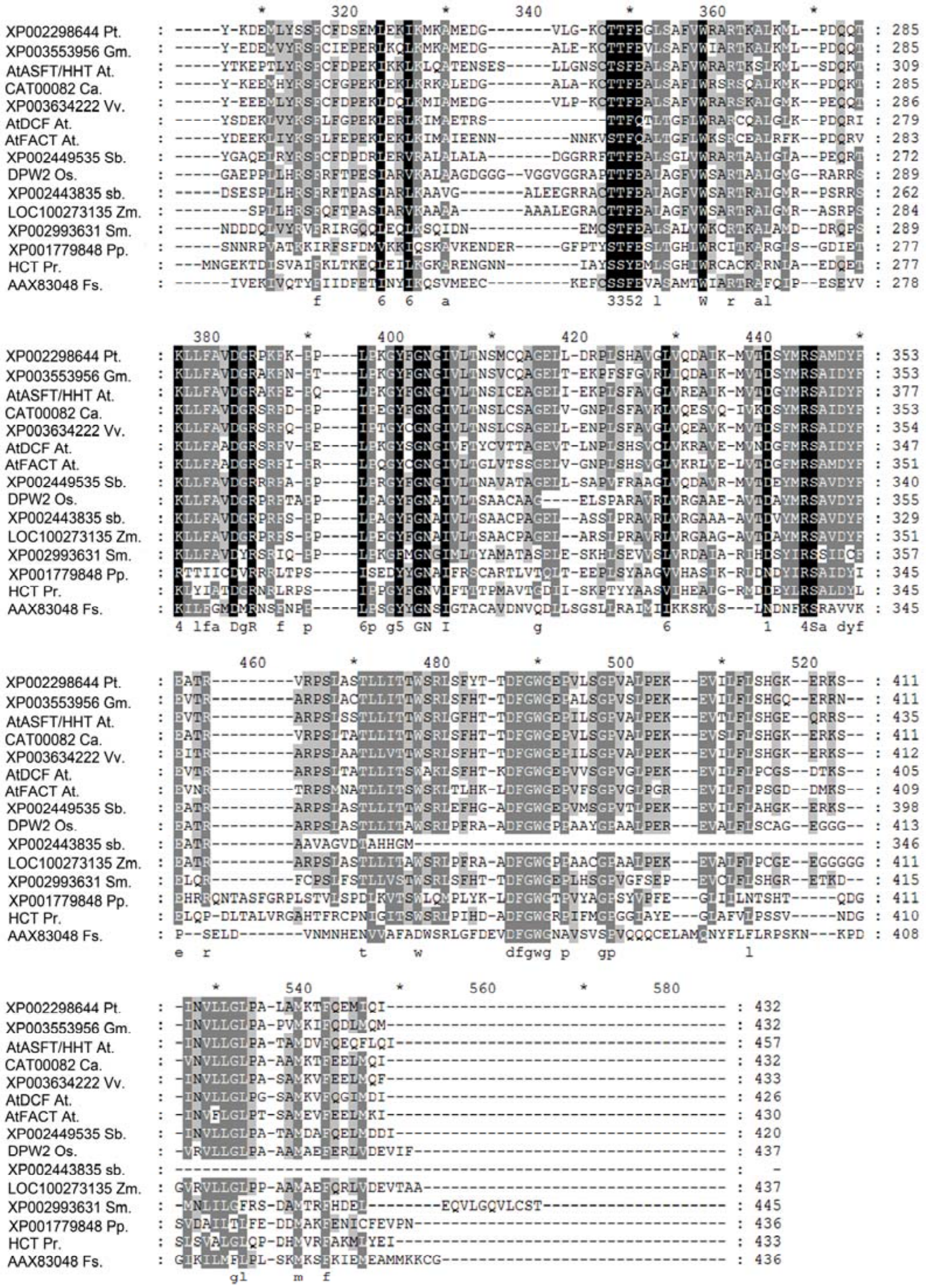
(D) to (F) Pollens stained with 2 % $I_2$-KI solution at stage 12 from WT (D), DPW2-complemented mutant dpw2-1com (E), and DPW2-complemented mutant dpw-2com (F) showing mature pollen grains. GDNA, genomic DNA.

(G) to (I) Mature panicle from WT (G), *dpw2-1* complemented with the

~4.34-kb wild-type genomic fragment (H), and *dpw2-2* complemented with the ~4.34-kb wild-type genomic fragment (I).

Bars=1mm in (A) to (C); 200 μm in (D) to (F); 2 cm in (G) to (I).


XP002298644 Pt.
XP003553956 Gm.
AtASFT/HHT At.
CAT00082 Ca.
XP003634222 Vv.
AtDCF At.
AtFACT At.
XP002449535 Sb.
DPW2 Os.
XP002443835 sb.
LOC100273135 Zm.
XP002993631 Sm.
XP001779848 Pp.
HCT Pr.
AAX83048 Fs.



**Supplemental Figure 4.** Sequence alignment of DPW2 and 14 DPW2-related proteins.

The alignment was used to produce the NJ phylogenetic tree shown in Figure 4.