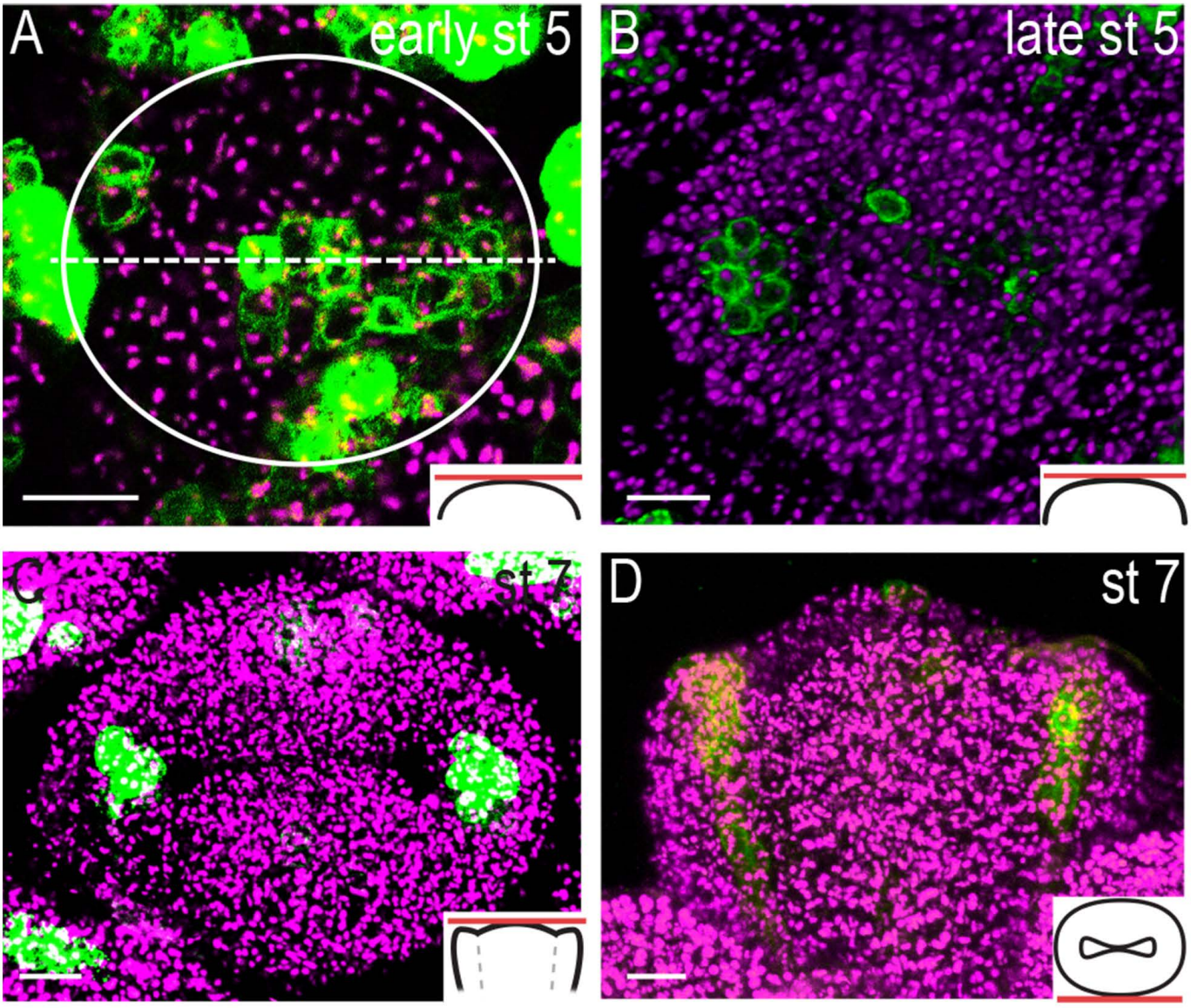
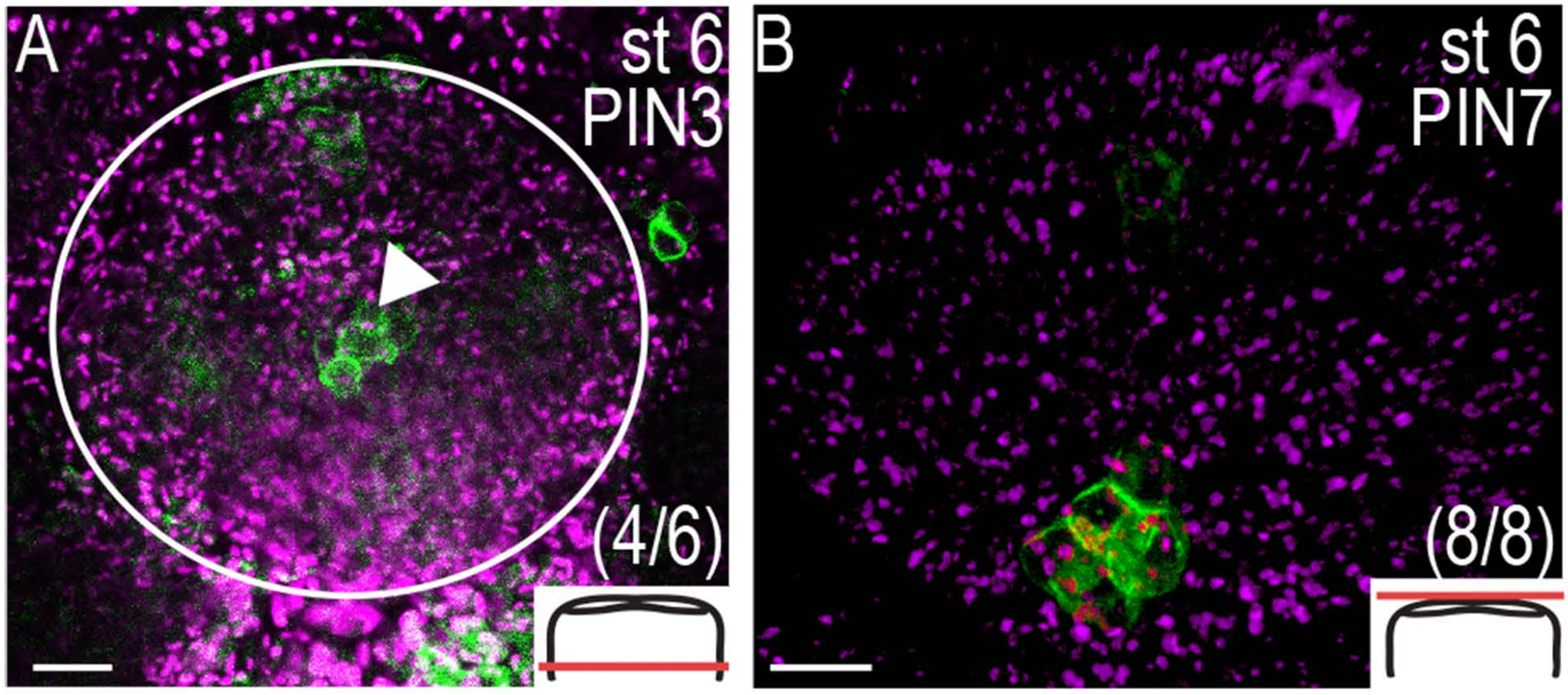
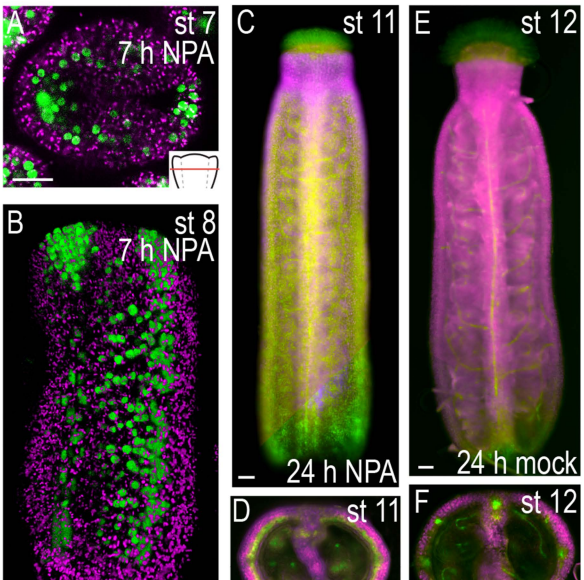


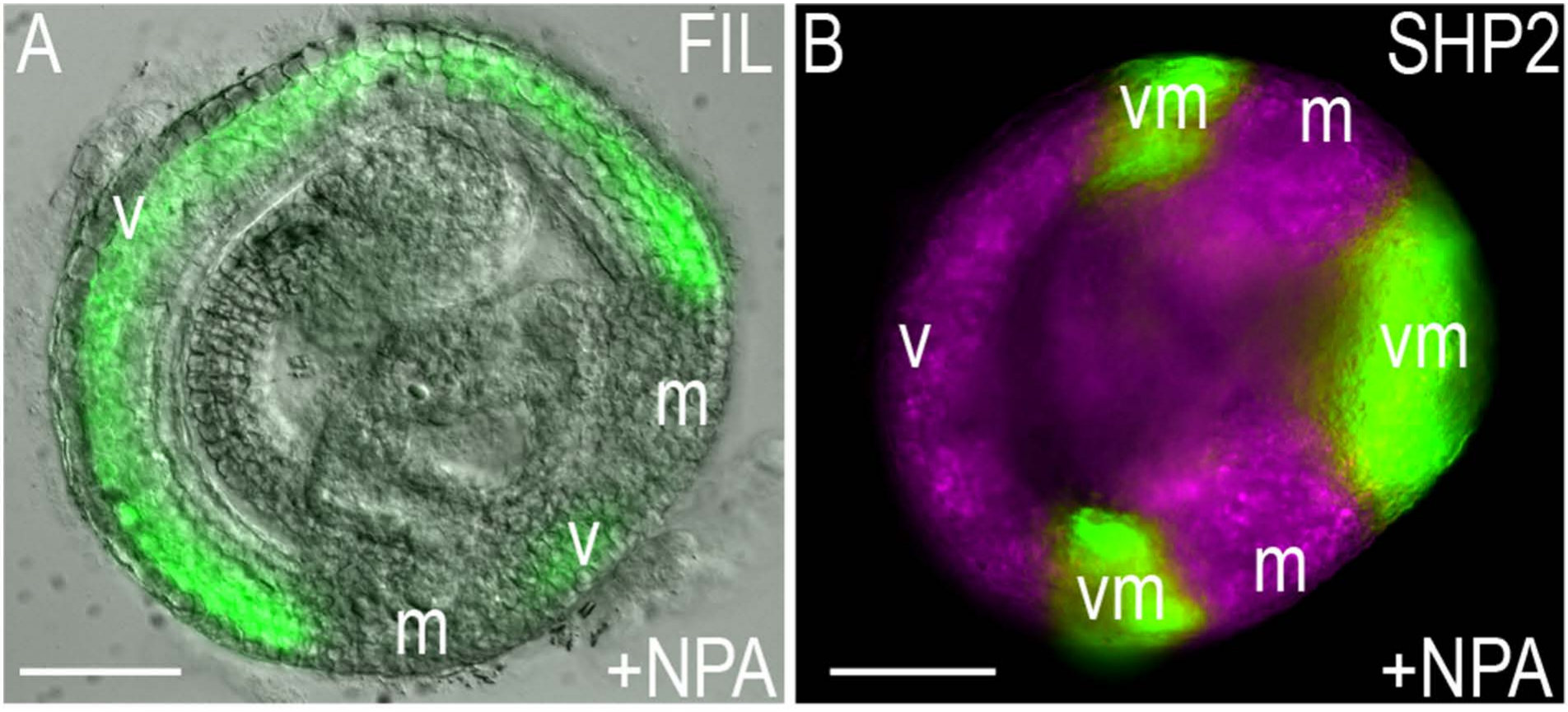
Supplemental Figure S1. The expression of *DR5rev:GFP* is identical to that of *DR5rev:3xVENUS-N7* during early gynoecial development. A, Optical transverse secion of the remaining floral meristem at early floral stage 5. B, Late floral stage 5 or early floral stage 6 gynoecial primordium viewed from above. C and D, Floral stage 7 gynoecia viewed from above (C) and from the medial side (D). Magenta indicates chlorophyll autofluorescence; circle indicates remnants of the floral meristem; dashed line indicates the lateral plane; schematic drawing in lower right corner indicates the tissue viewed. Scale bar = 10 μm.



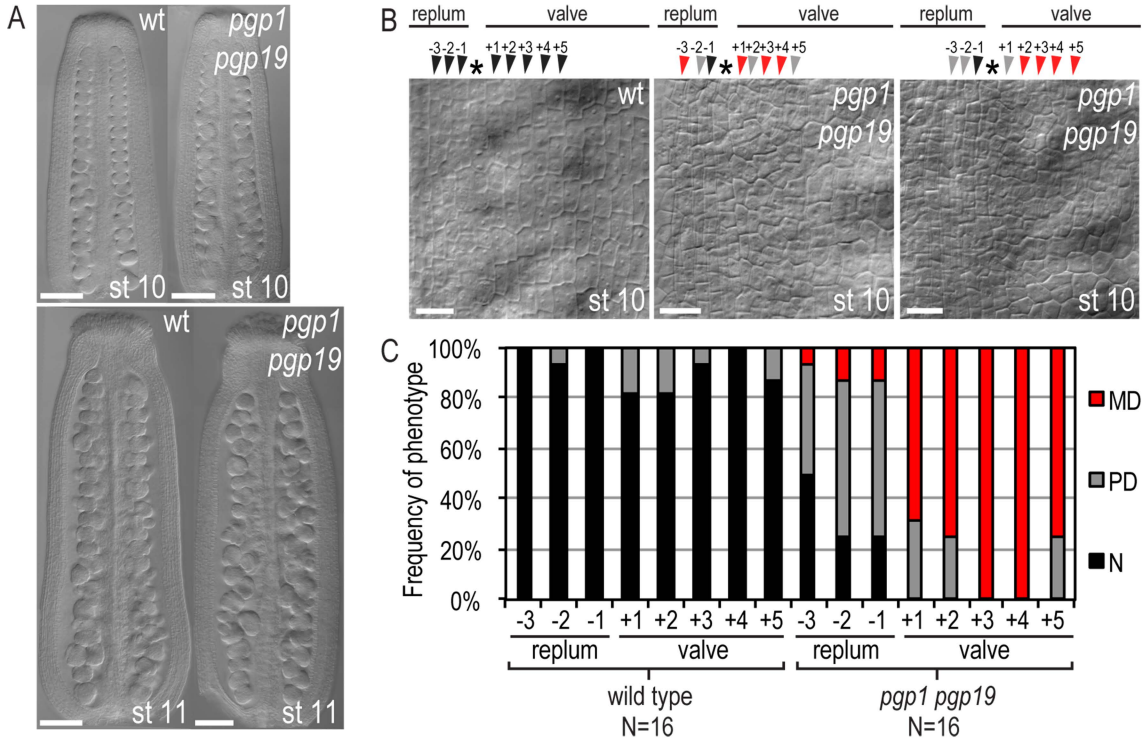
Supplemental Figure S2. *PIN3pro:PIN3-GFP* and *PIN7pro:PIN7-GFP* are expressed in the basal part of of gynoecia at floral stag 6. A, *PIN3pro:PIN3-GFP* expression in the center of the gynoecial base at floral stage 6. B, *PIN7pro:PIN7-GFP* expression in the basal medial part of a stage 6 gynoecium viewed from above. Magenta indicates chlorophyll autofluorescence; circle indicates gynoecial primordium; arrowhead indicates basal PIN3 expression; schematic drawing in lower right corner indicates the tissue viewed; (parentheses) indicate fraction of gynoecia showing the displayed features. Scale bar = 10 µm.



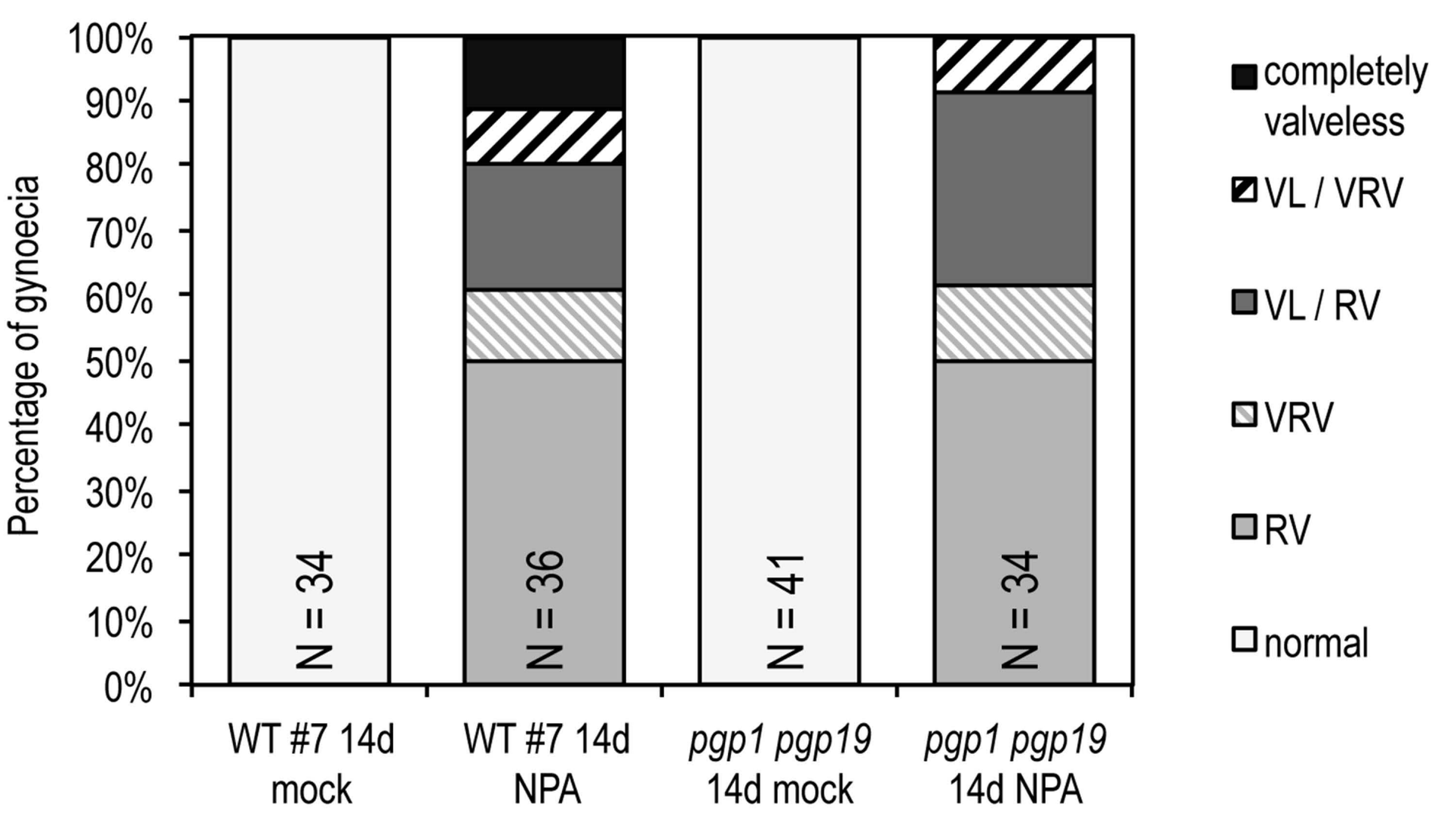
Supplemental Figure S3. DR5 expression after NPA-treatment. A and B, *DR5rev:3xVENUS-N7* expression is broadened 7h after NPA-treatment in optical transverse section of floral stage 7 gynoecium (A) and in floral stage 8 gynoecium (B). C-F, *DR5rev:GFP* expression in mature gynoecia is expanded in the adaxial tissues of the gynoecial valves 24h after NPA-treatment (C and D) compared to mock-treated gynoecia (E and F). Magenta indicates chlorophyll autofluorescence. Schematic drawing in lower right corner indicates the tissue viewed Scale bars = 20 µm (A and B) and 50 µm (C-F).



Supplemental Figure S4. The mediolateral axis is shifted 2 weeks after NPA-treatment. Transverse sections of A, *FILpro:GFP* expression and B, *SHP2pro>>YFP* expression in in transverse sections of mature gynoecia 2 weeks after NPA-treatment. Magenta indicates chlorophyll autofluorescence; m = medial tissues; v = valve; vm = valve margins. Scale bars = 50 μm.



Supplemental Figure S5. Loss of PGP1 and PGP19 leads to disorganized epidermal cell patterning in both medial and lateral gynoecial tissues. A, Images of whole-mounted, cleared wild type (wt) and *pgp1 pgp19* mutant gynoecia at stage 10 (above) and stage 11 (below). B, Representative images of epidermal tissue patterning from cleared wt and pgp1 pgp19 stage 10 gynoecia. Replum and valve tissue domains are marked above each image. For consistency between individual gynoecia, epidermal cell files analyzed were relative to the estimated boundary between valve and replum tissue (asterisk). Arrowheads point towards the three replum files (-1 through -3) and the five valve files quantified (+1 through +5). A black arrowhead indicates a normally organized file of epidermal cells; a grey arrowhead indicates a partly disorganized file of epidermal cells; a red arrowhead indicates a mostly disorganized file of epidermal cells. Normal organization, cells generally rectangular with traceable cell lineages; partly disorganized, frequently irregular cell shapes and cell lineages that were sometimes not traceable; mostly disorganized, nearly all cells were of an irregular, non-rectangular shape and cell lineages were difficult or impossible to trace. C, A bar graph depicting the frequency of normal (N), partly disorganized (PD) and mostly disorganized (MD) epidermal cell organization observed in wt or *pgp1 pgp19* mutant gynoecia at stage 10 and 11. The frequency of epidermal organization was quantified for the three replum cell lines (-1 through -3) and the five valve cell lines (+1 through +5) neighboring the estimated boundary between valve and replum tissue as depicted in (B). Scale bars = 50 µm (A) and 10 µm (B).



Supplemental Figure S6. Loss of PGP1 and PGP19 results in a reduced frequency of valveless gynoecia developed after NPA treatment. Valve development phenotype of wild type (wt) and *pgp1 pgp19* double mutants were quantified after 14 days of mock and NPA treatment. The gynoecia analyzed were dissected from cleared late stage 11 to early stage 13 flowers. Each category represents the phenotypes observed for both valve domains. When one valve phenotype differed from the other valve in the same gynoecium, a '/' is used to separate the two phenotypes observed. Normal, both valves develop normally; RV, reduced valve; VRV, very reduced valve; VL, valveless domain; completely valveless, a rod-like gynoecium with no discernible valve development. N, the number of gynoecia quantified per genotype. A minimum of three biological replicates was used for each genotype and treatment.