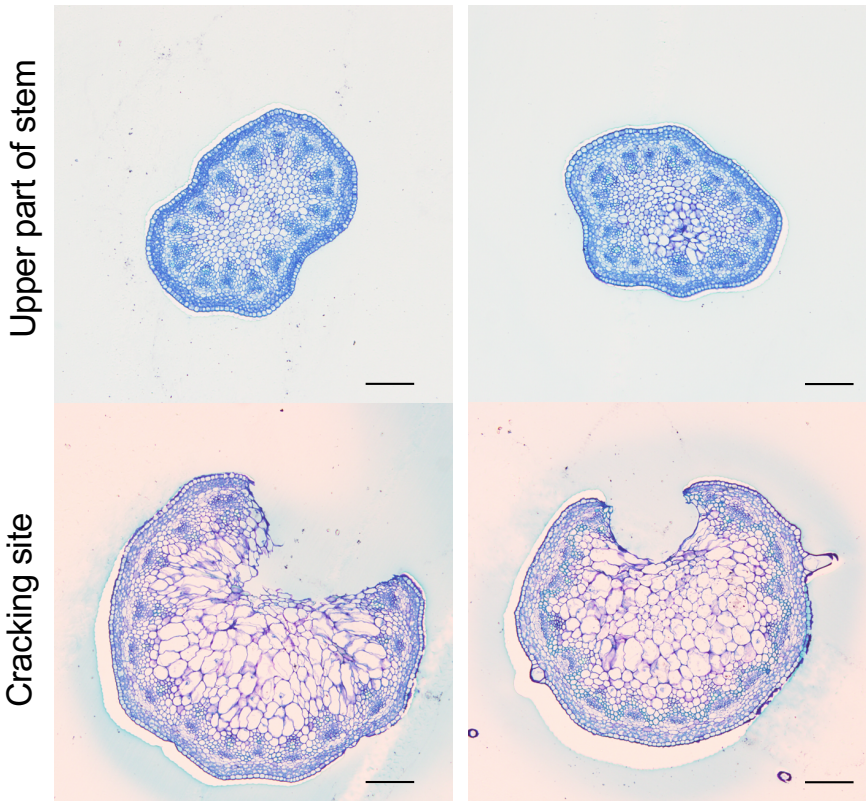


Fig. S1. Histological cross sections of different parts of cracked stems

Histological cross sections from *clv3-8 det3-1* plant stems immediately after cracking. After confirming that a crack had occurred, stems were collected and fixed on the same day for histological analyses. Images show representative cross sections of the cracked region (lower panels) and the upper part of the same flowering stem (upper panels). Both stems were collected at 29 DAS. Scale bars: 100 µm.

Fig. S2A

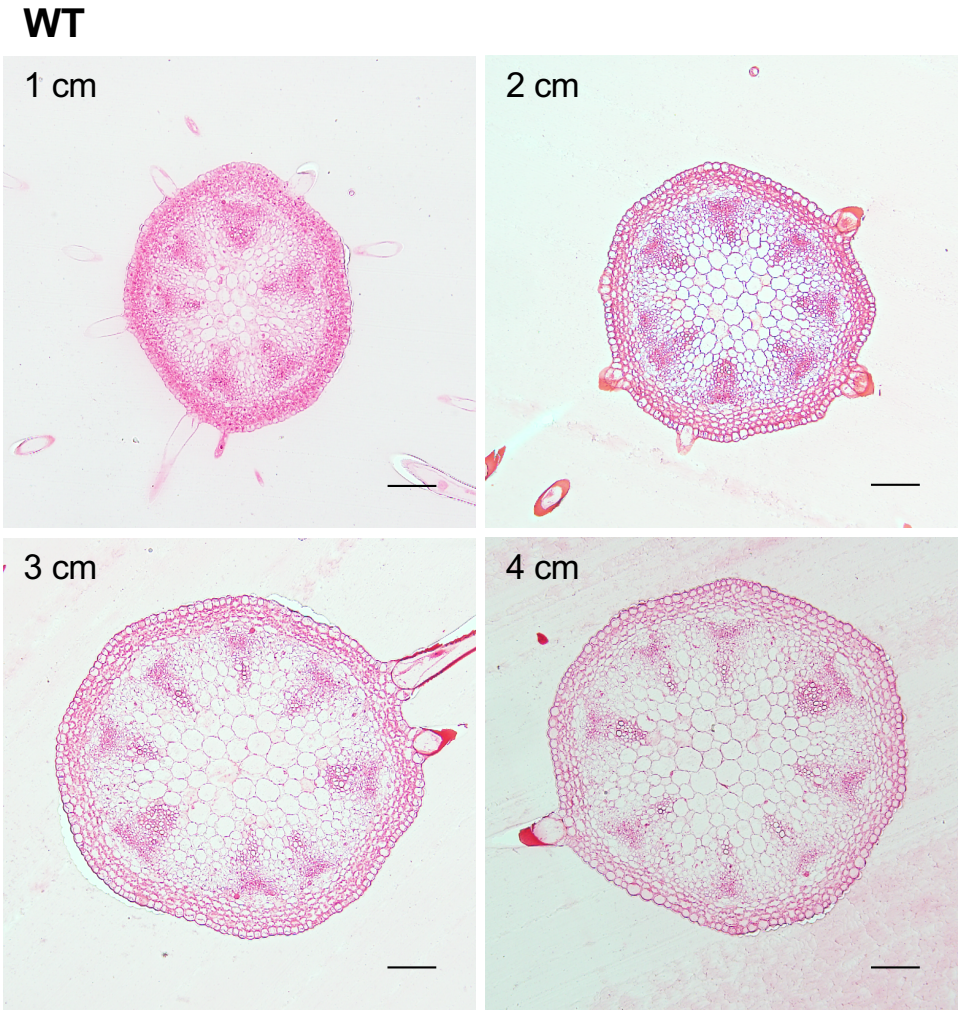


Fig. S2B

clv3-8

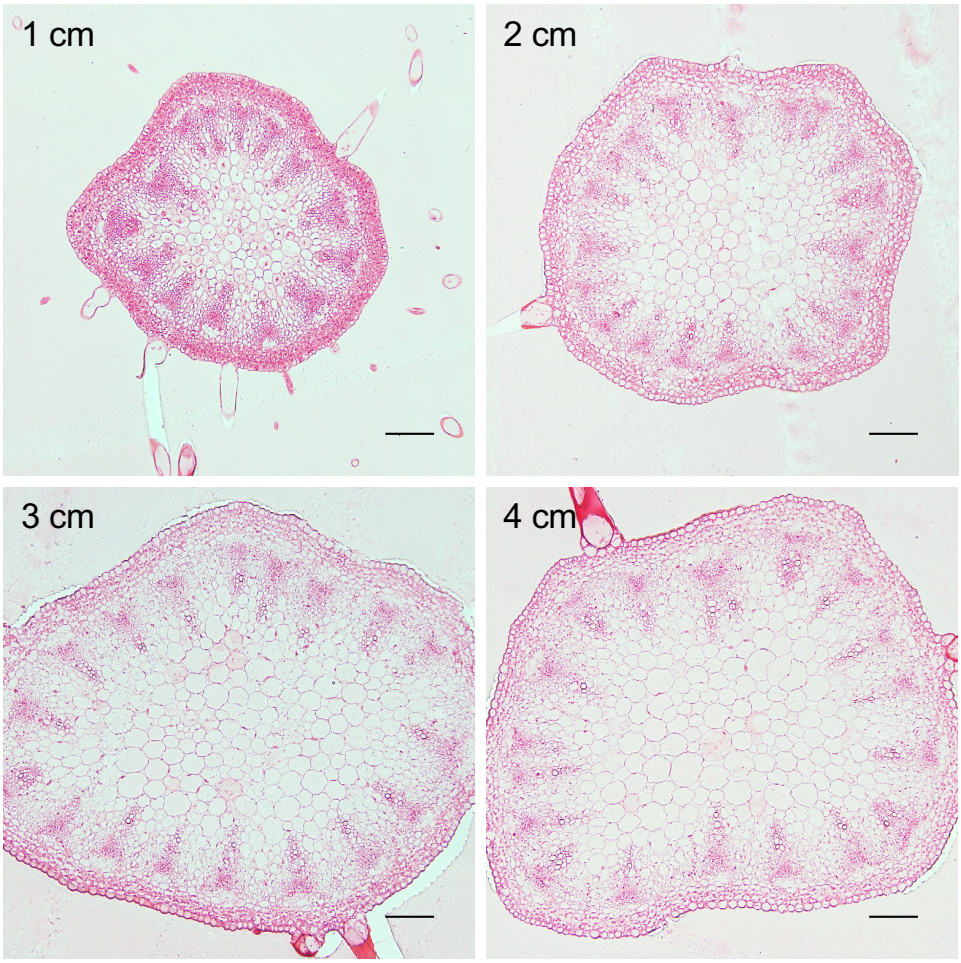


Fig. S2C

det3-1

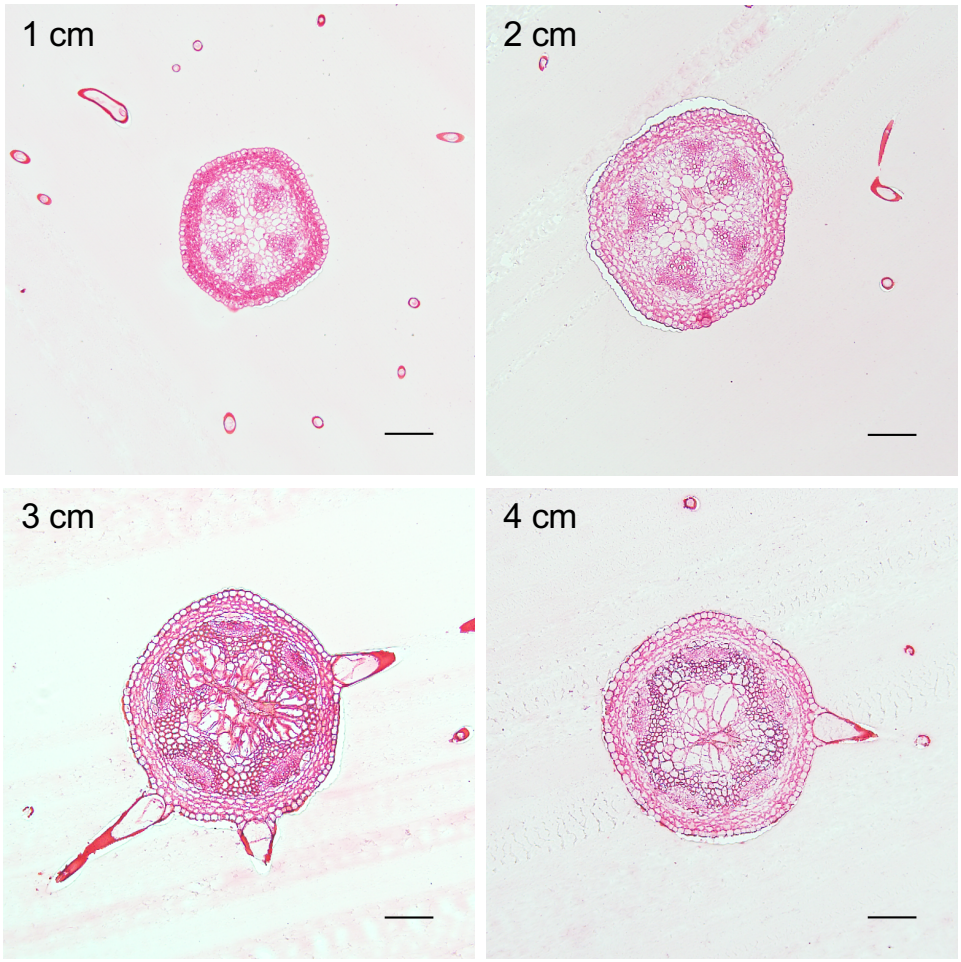
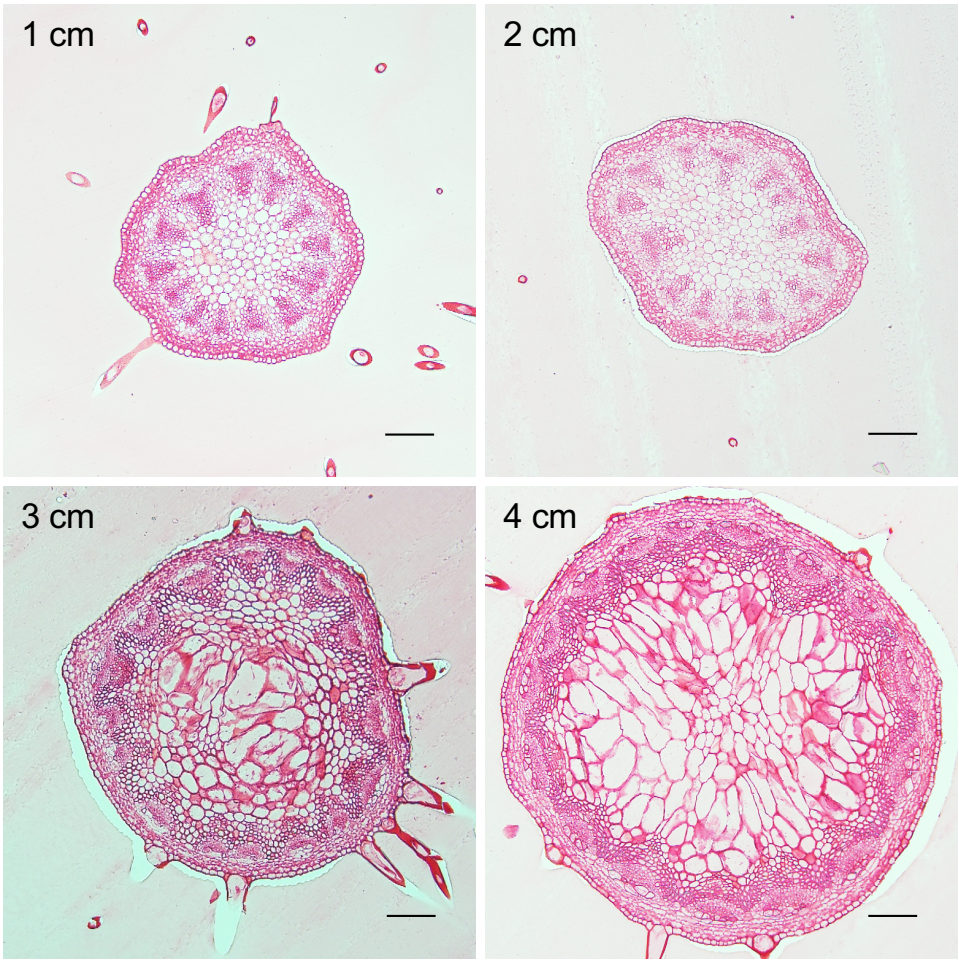


Fig. S2D

clv3-8 det3-1



Figs. S2A-D. Stem inner morphology at four distinct developmental stages

Histological cross sections at 5 mm from the base of each flowering stem, showing inner tissue organization in WT (Fig. S2A), *clv3-8* (Fig. S2B), *det3-1* (Fig. S2C), and *clv3-8 det3-1* (Fig. S2D) plants. Stems were collected at the growth stages indicated when the flowering stems reached 1, 2, 3, and 4 cm in length. Histological cross sections were stained with safranin. Scale bars: 100 µm.

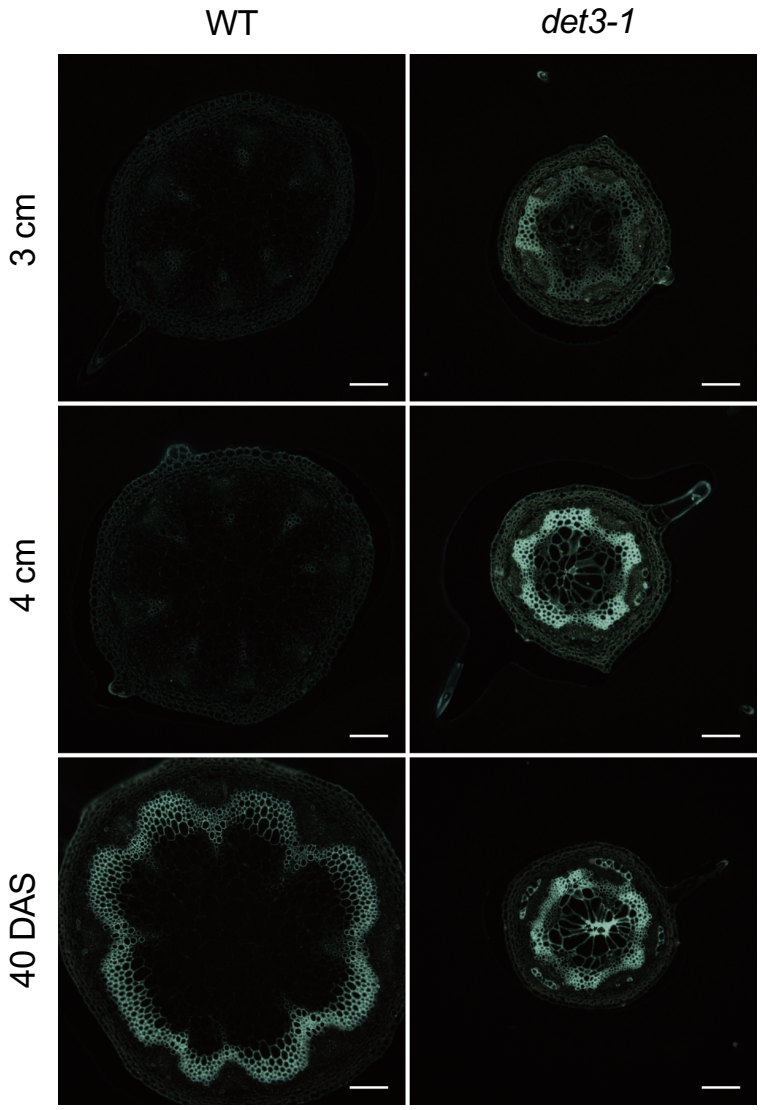


Fig. S3. Pith cell lignification in the *det3-1* mutant
Lignin deposition is shown in *det3-1* stems at the 3- or 4-cm stage, and at 40 DAS. The white cells indicate lignin autofluorescence in response to excitation with ultraviolet light. Scale bars: 100 µm. Images were recorded at the same intensity and processed using ImageJ software (LOCI; University of Wisconsin).

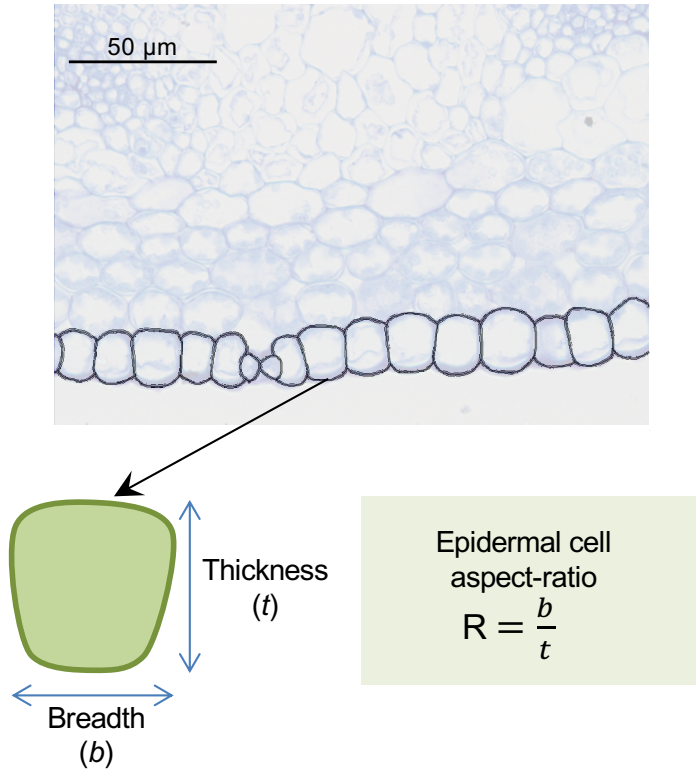


Fig. S4. Definition of epidermal cell aspect ratio to evaluate epidermal cell shape

The thickness (*t*) and breadth (*b*) of epidermal cells were determined from cross-sectional images of flowering stems. Cell thickness was defined as the maximal length of an epidermal cell in the radial direction of the flowering stem. Cell breadth was defined as the maximal length of an epidermal cell along the edge of the flowering stem. The epidermal cell aspect ratio (R) was calculated by dividing (*b*) by (*t*). Flatter epidermal cells have greater R values.

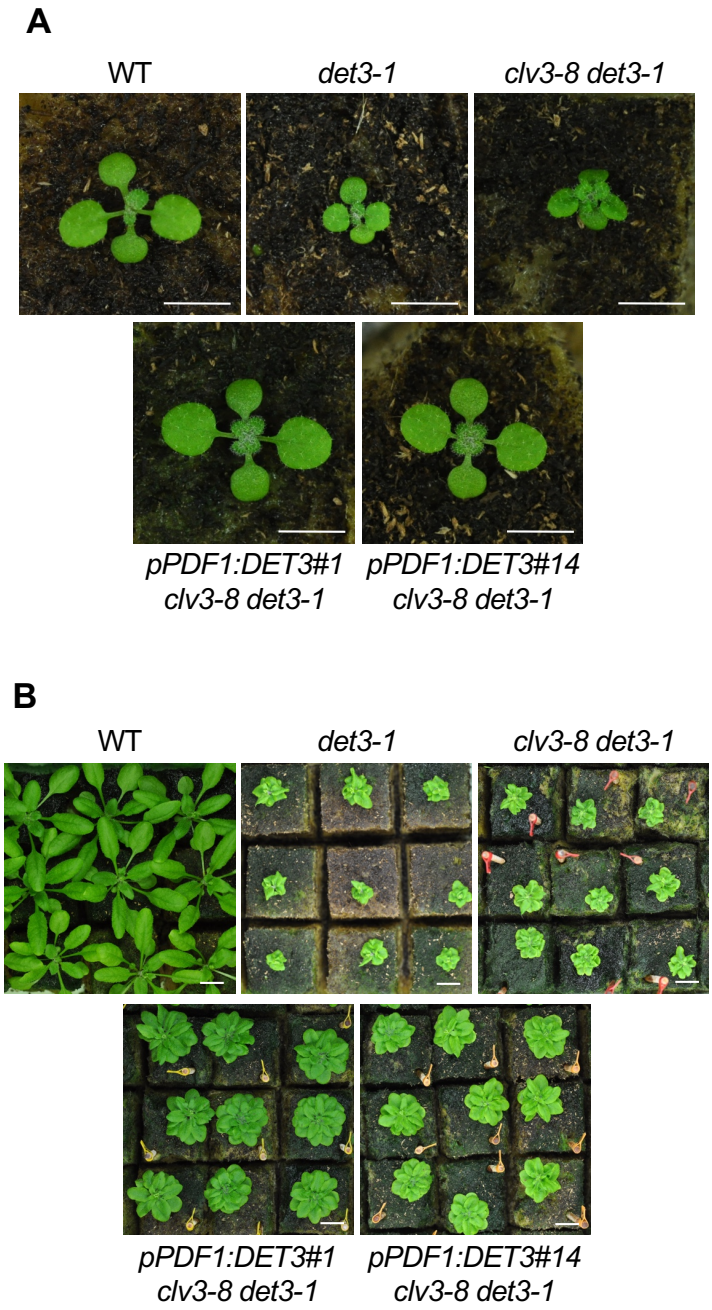


Fig. S5. Overall morphology of tissue-specific complemented lines at the vegetative stage

The plant genotypes indicated were grown on rockwool. Images of the plants from above were recorded at 13 DAS **(A)** and 27 DAS **(B)**. Scale bars: 5 mm in **(A)** and 1 cm in **(B)**.