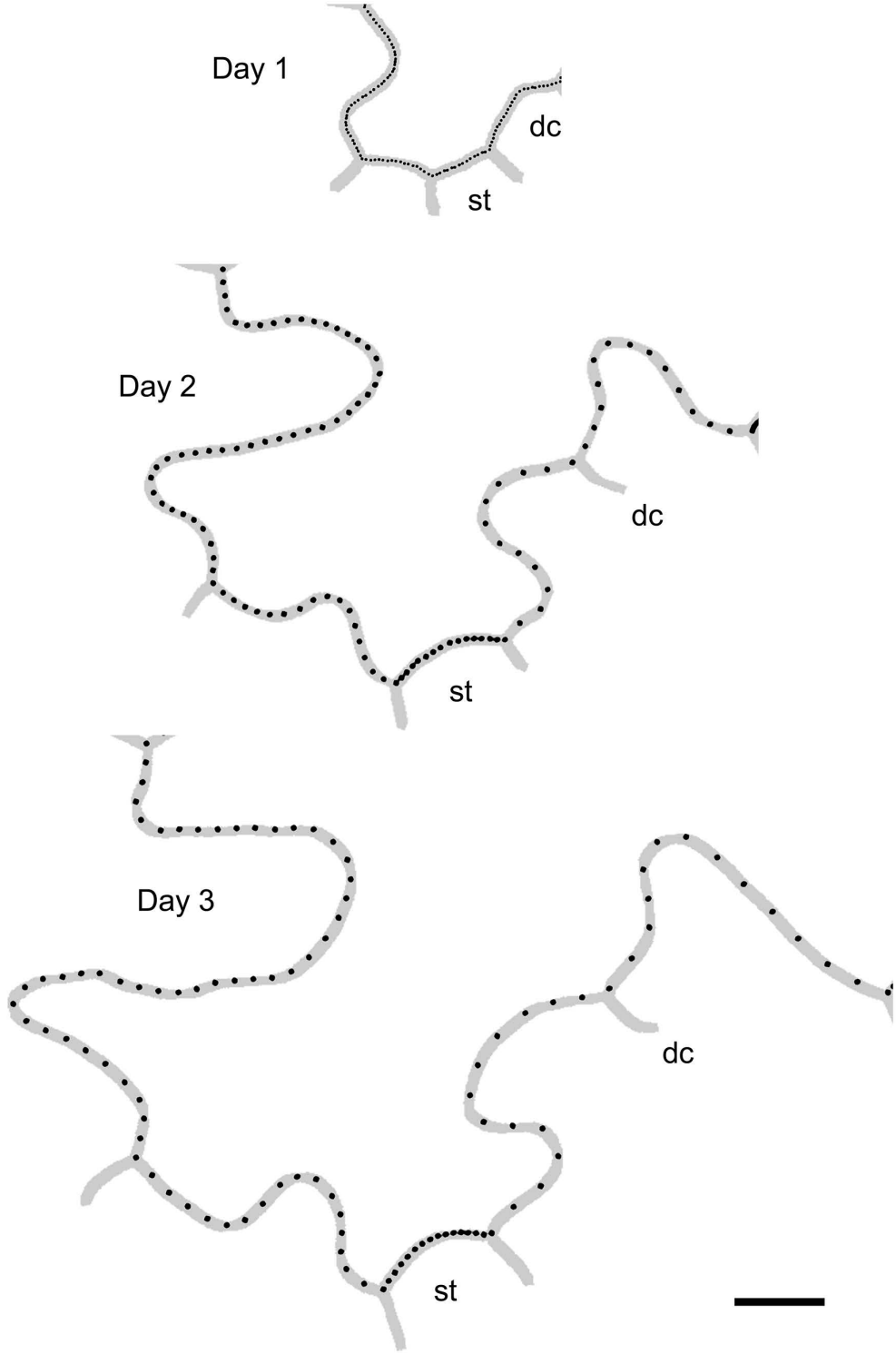
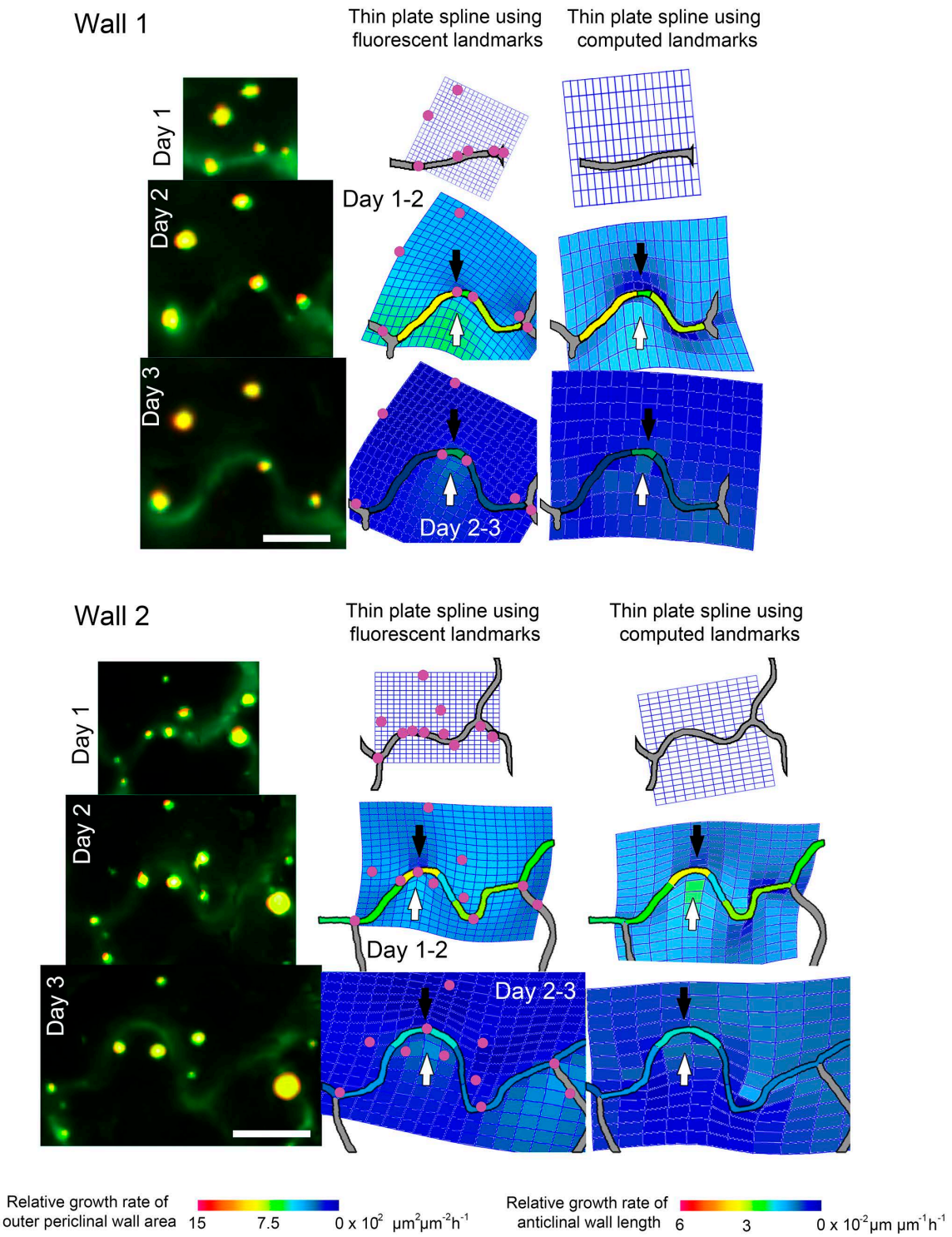
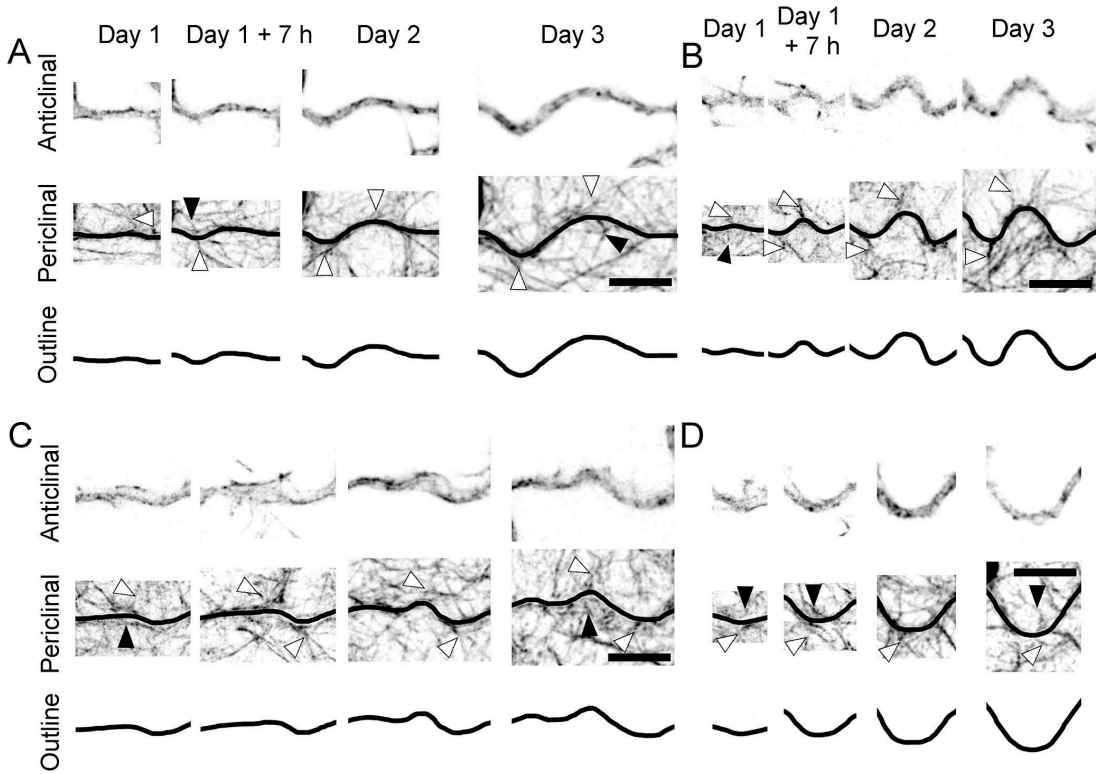


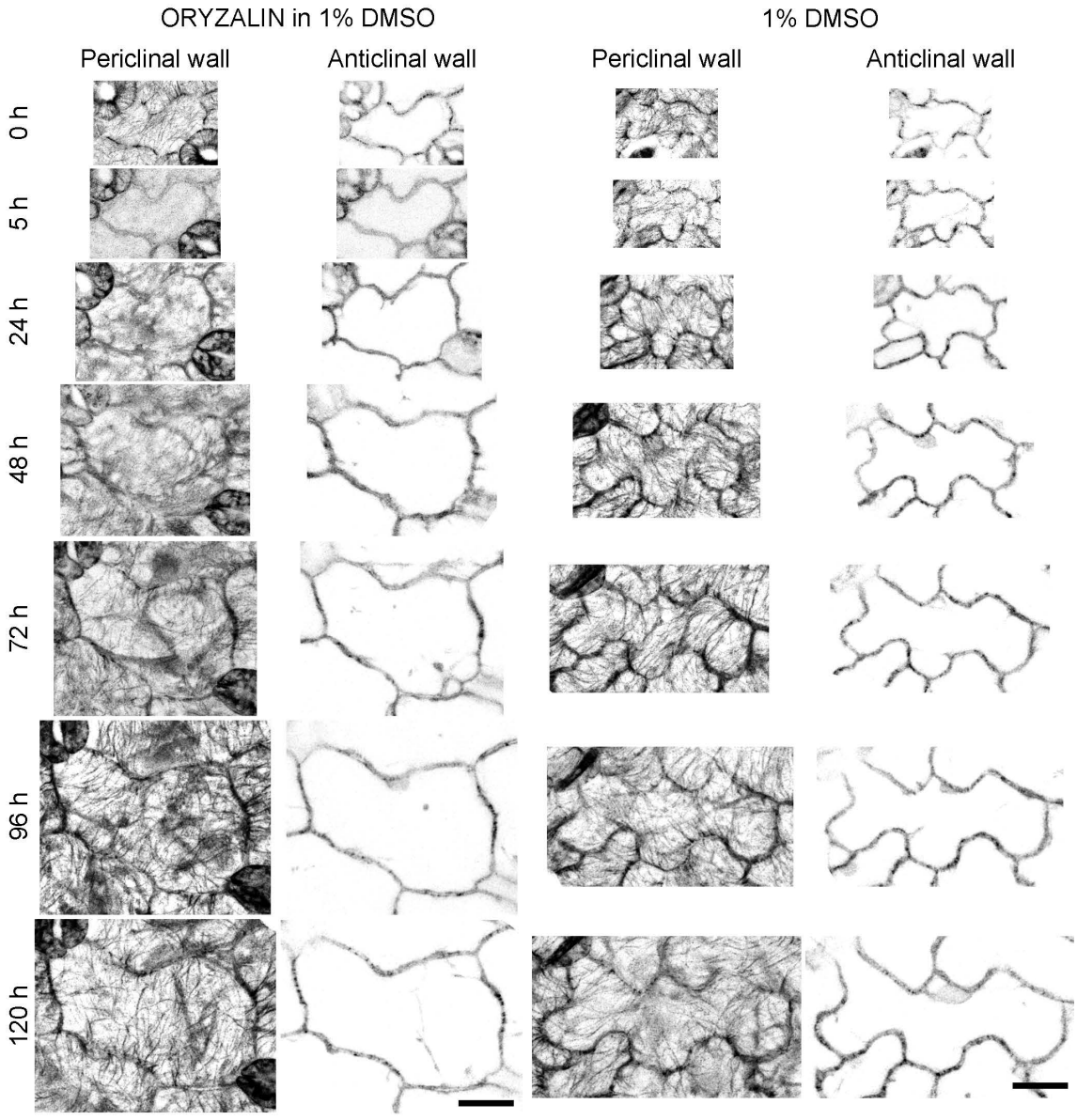
Supplemental Figure 1. Spread of computed homologous landmarks along anticlinal wall segments over time from the lower half of the cell in Figure 1A. At day 1, computed homologous landmarks (black dots) were placed at 0.5 µm intervals along each anticlinal wall segment between two wall junctions. The growth of each wall segment differed with the wall of a stomate (st) growing the least and the wall of a dividing cell (dc) growing the most by day 2 and 3. To investigate the change in cell shape using the thin plate spline technique (Figure 1C), which requires a fixed number of landmarks, it was assumed that anticlinal wall growth within each wall segment was uniform with the landmarks spreading apart at equal distances depending on the amount of wall growth – smaller distances between the landmarks indicate less growth and larger distances between landmarks indicate more growth. Bar = 10 µm.



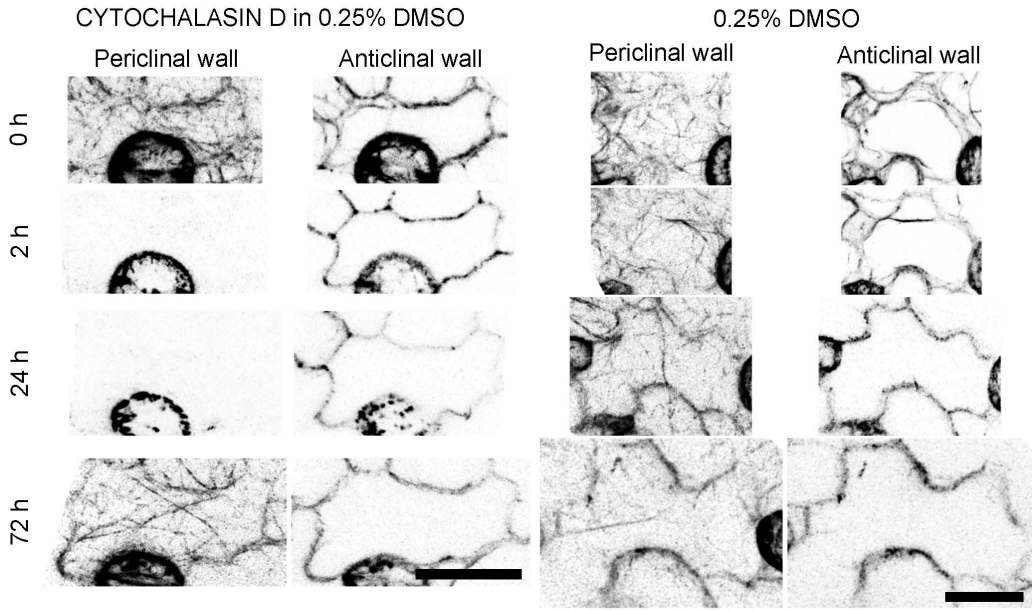
Supplemental Figure 2. Comparison of two thin plate spline analysis approaches. Lobe development in two cell walls (from Figure 3C, D) investigated using two thin plate spline approaches: 1) using externally applied fluorescent landmarks, lobe tips and wall junctions as homologous markers (represented by magenta dots) and 2) using computed landmarks positioned along the anticlinal wall (for details of this approach see Supplemental Figure 1). Both thin plate spline approaches show restriction of growth on the convex side of a developing lobe (black arrows) and faster expansion on the concave side (white arrows). Bar = 10 µm.



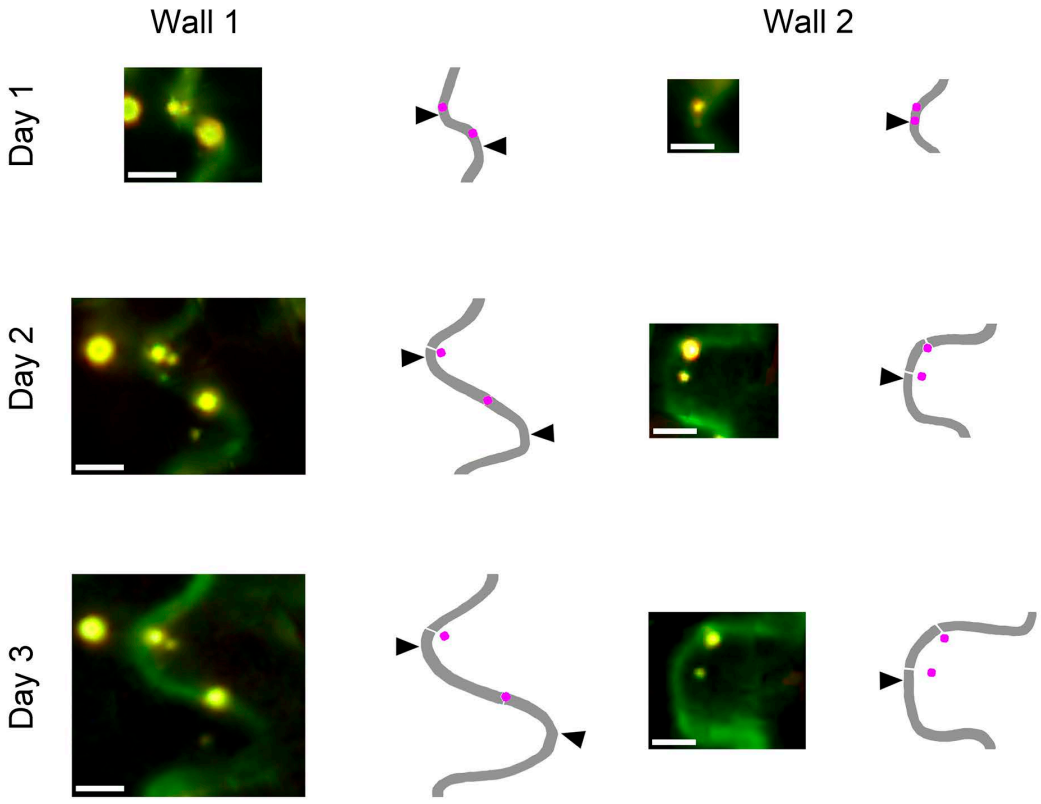
Supplemental Figure 3. Actin filaments do not predict the site of lobe formation. Actin filament arrays at four walls during lobe development of pavement cells expressing GFP-fABD2 from 1-3 days after germination. Fluorescence images are optical sections of the anticlinal wall at the middle of the cell and projections of serial sections of the cortical cytoplasm next to the outer periclinal wall. Bundles of cortical actin filaments at the outer periclinal wall were perpendicular to the anticlinal wall at the convex sides (white arrowheads) and concave sides (black arrowheads) of lobes. At day 1, regions where the concave and convex side of lobes would later form had actin filaments at the periclinal wall on both sides of the anticlinal wall (**B-D**) or the convex side alone (**A**). At day 2 and 3, actin filaments were often enriched on the convex side of lobes (**A-D**). Bars = 10 µm.

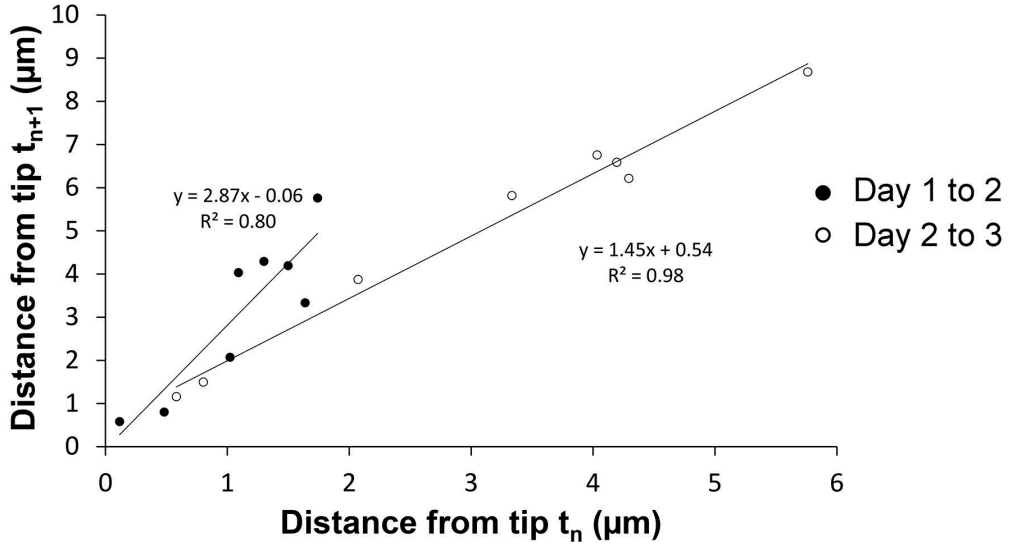


Supplemental Figure 4. Disruption to microtubule arrays using a chemical inhibitor, and their recovery.
Microtubules in pavement cells expressing GFP-TUB6, treated with oryzalin or 1% DMSO. Drugs were applied after imaging at 0 h for a total of 4 h (2 x 2 h) and, by 5 h, microtubules of cells treated with oryzalin had depolymerised. Microtubules started recovering at 48 h and were present at 72 h, 96 h and 120 h after the initial treatment. They were unaffected by the DMSO treatment. Images are projections of serial sections of the cortical cytoplasm next to the outer periclinal wall and optical sections of the anticlinal wall at the middle of the cell. Bars = 20 µm.



Supplemental Figure 5. Disruption to actin filament arrays using a chemical inhibitor, and their recovery.
Filamentous actin in pavement cells expressing GFP-fABD2 were treated with cytochalasin D or 0.25% DMSO after initial imaging at 0 h. Actin filaments adjacent to the periclinal wall disappeared from cells treated with cytochalasin D by 2 h, but recovered by 72 h. Filamentous actin was unaffected by the DMSO treatment. Images are projections of serial sections of the cortical cytoplasm next to the outer periclinal wall and optical sections of the anticlinal wall at the middle of the cell. Bars = 20 μm.





Supplemental Figure 6. Lateral displacement of externally applied landmarks near lobe tips.
Two anticlinal walls (green) and the position of externally applied fluorescent markers on the outer periclinal walls (yellow) during lobe formation from 1-3 days after germination. The lateral distance along the anticlinal wall of fluorescent markers (represented as magenta dots) from lobe tips (arrowhead) was measured at each day. The lateral displacement of eight externally applied markers across seven lobes was compared between days. Bars = 5 µm.