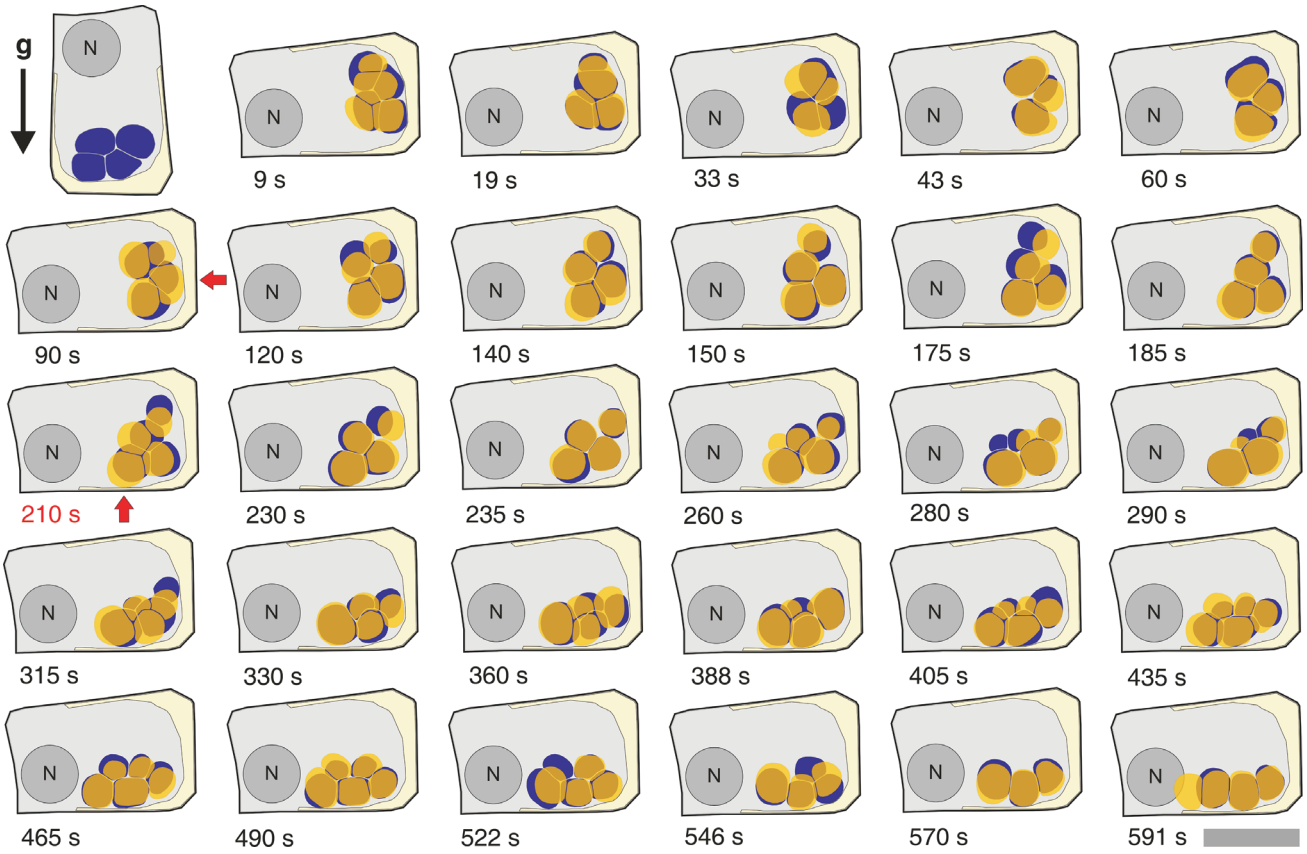
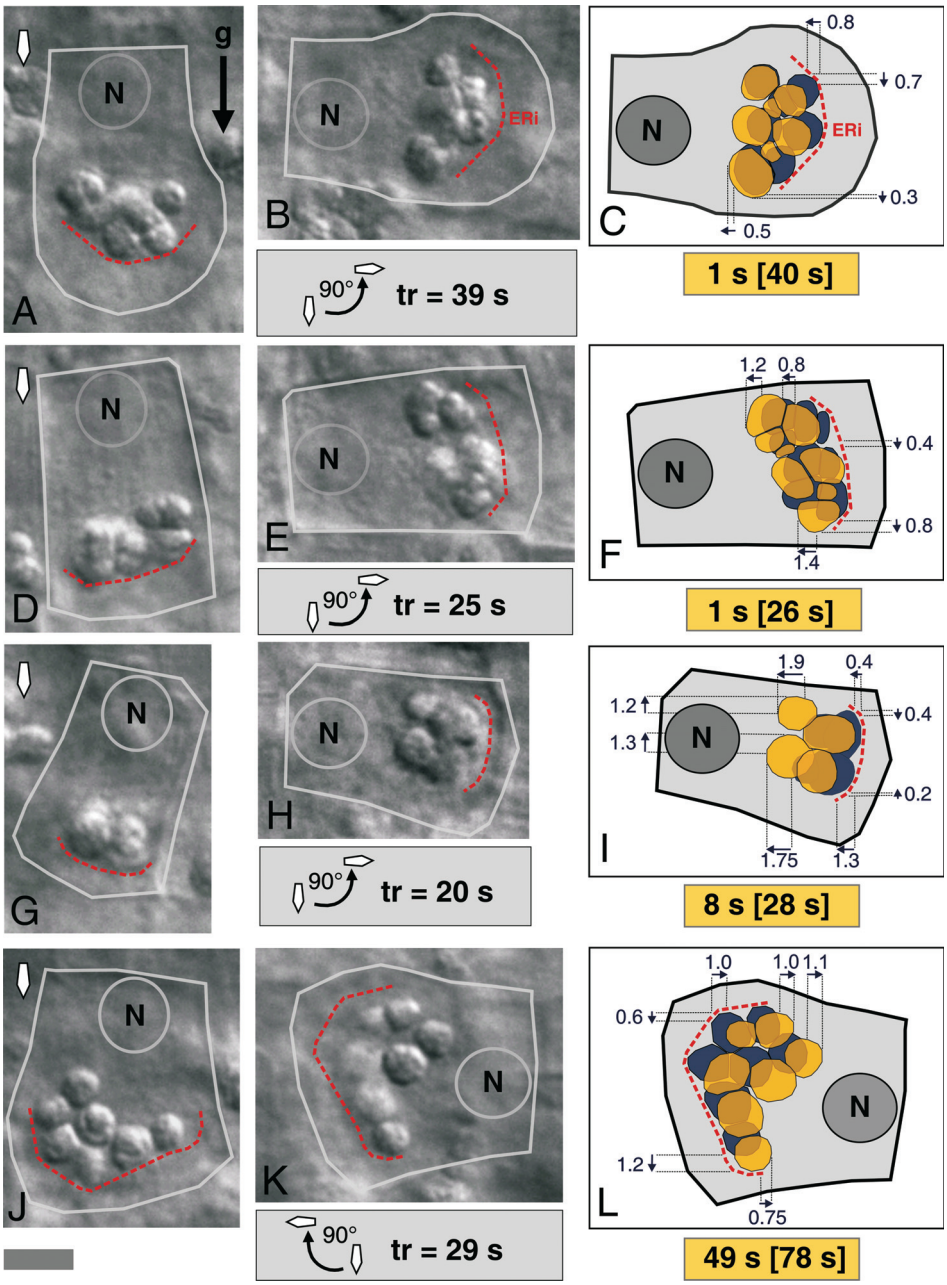
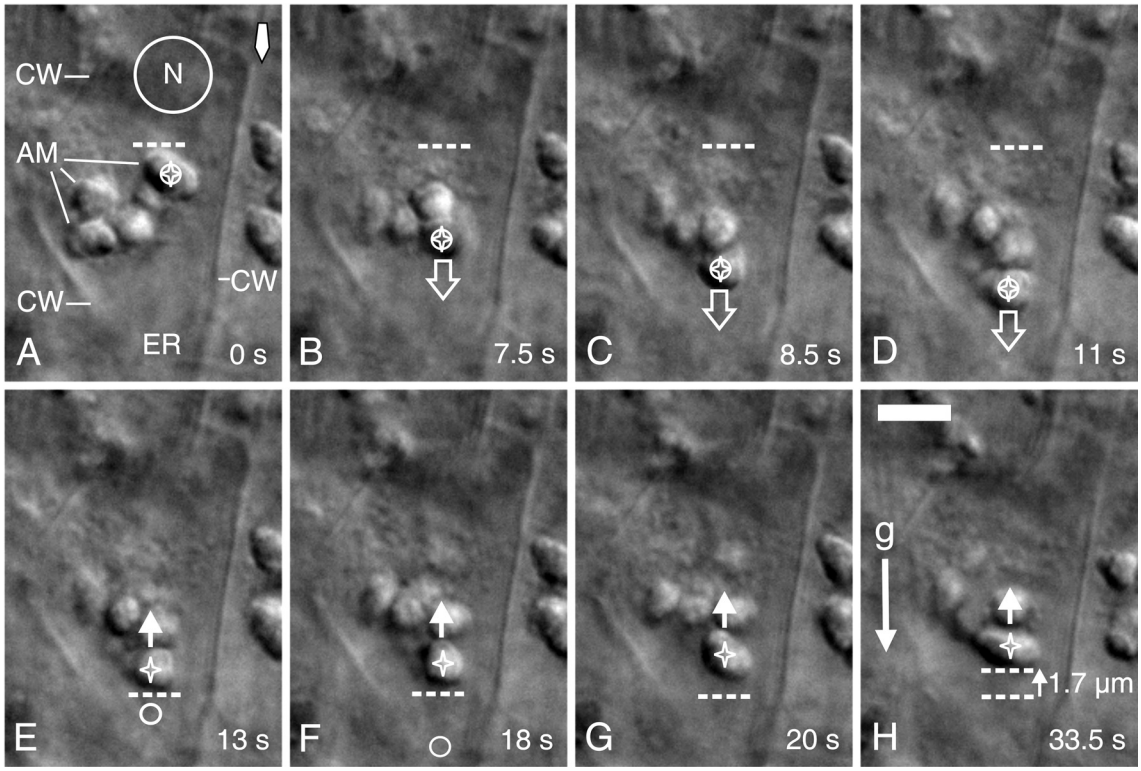
Supplemental Data. Leitz et al. (2009). Statolith Sedimentation Kinetics and Force Transduction to the Cortical Endoplasmic Reticulum in Gravity-sensing *Arabidopsis* Columella Cells.



Supplemental Figure 1. Sedimentation kinetics of statoliths in relation to the cortical ER boundary in a central S2 columella cell from *Arabidopsis* at various time points (s) after 90° reorientation. The cortical ER boundary and position of the statoliths was determined by motion analysis from a series of DIC micrographs (Figure 2). The top left drawing shows the position of the aggregated statoliths (blue) within the columella cell immediately before reorientation. The subsequent drawings illustrate the sedimentation of statoliths as aggregates in relation to the cortical ER boundary (light yellow). The current statolith positions (dark transparent yellow) are superimposed on the preceding statolith positions (blue). The duration of the 90º root reorientation was 9 s. Some close contacts with the former distal ER interface (90 s) and the new lower ER interface (210 s) are indicated by red arrows, see also quantitative data for this image series (Figure 3). The direction of gravity (g) is as indicated. N = nucleus. Bar = 10 µm.



Supplemental Figure 2. Motion analysis of the initial response of statoliths in central S2 *Arabidopsis* columella cells after 90° root reorientation. (A) – (L) Differential interference contrast (DIC) micrographs showing the statoliths within a central columella cell before (A, D, G, J) and after 90° root reorientation (B, E, H, K). In (C, F, I, L) the retraced positions of the statoliths after the 90° reorientation (transparent yellow) are superimposed on the position of the statoliths before reorientation (blue). The net movement of statoliths is towards the central cytoplasm, the direction of the horizontal and vertical statolith displacements are as indicated (small black arrows) and the corresponding distances are given in microns. The gravity vector (g), the orientation of the root tip (diamond-shaped arrow), the approximate position of the cell nucleus (N) and the position of the ER boundary at the distal end of the columella cell (ERi = dashed red line) are as indicated. The cell wall (CW) boundary (grey line) is outlined. The duration of reorientation (tr) and the time interval are given in seconds [s]. Bar = 5 µm.



Supplemental Figure 3. Elastic rebound of a statolith moved by optical force against the cortical ER boundary in gravity-sensing *Arabidopsis* columella cells. (A) – (D) A single statolith (✧) within an aggregate of statoliths is moved by optical force (○) into the wider ER area located at the bottom of a central columella cell (the wide arrow indicates the direction of movement). The root is in normal vertical orientation at 0º with respect to the gravity vector (g). The diamond-shaped arrow points towards the root tip. AM = amyloplasts, CW = cell wall, ER = endoplasmic reticulum. The dashed line indicates the original position of the statolith before the downward movement. **(E) – (H)** The optical trap (○) is continuously moved by laser beam steering to the bottom area of the cell and then beyond the lower cell wall boundary. The statolith held by the optical force subsequently escapes from the optical trap (○) when the resistance generated by the compression of ER containing cytoplasm near the lower cell wall boundary is too high to hold the statolith by the optical forces (E). The escape of the statolith (✧) from the optical trap (○) causes the statolith to move upwards (white arrow) against the gravitational force (g) effectively pushing several nearby statoliths upwards. The dashed lines indicate the original position of the statolith before the upward movement (E – H) and the end position (H). The time is given in seconds (s). Bar = 5 µm.