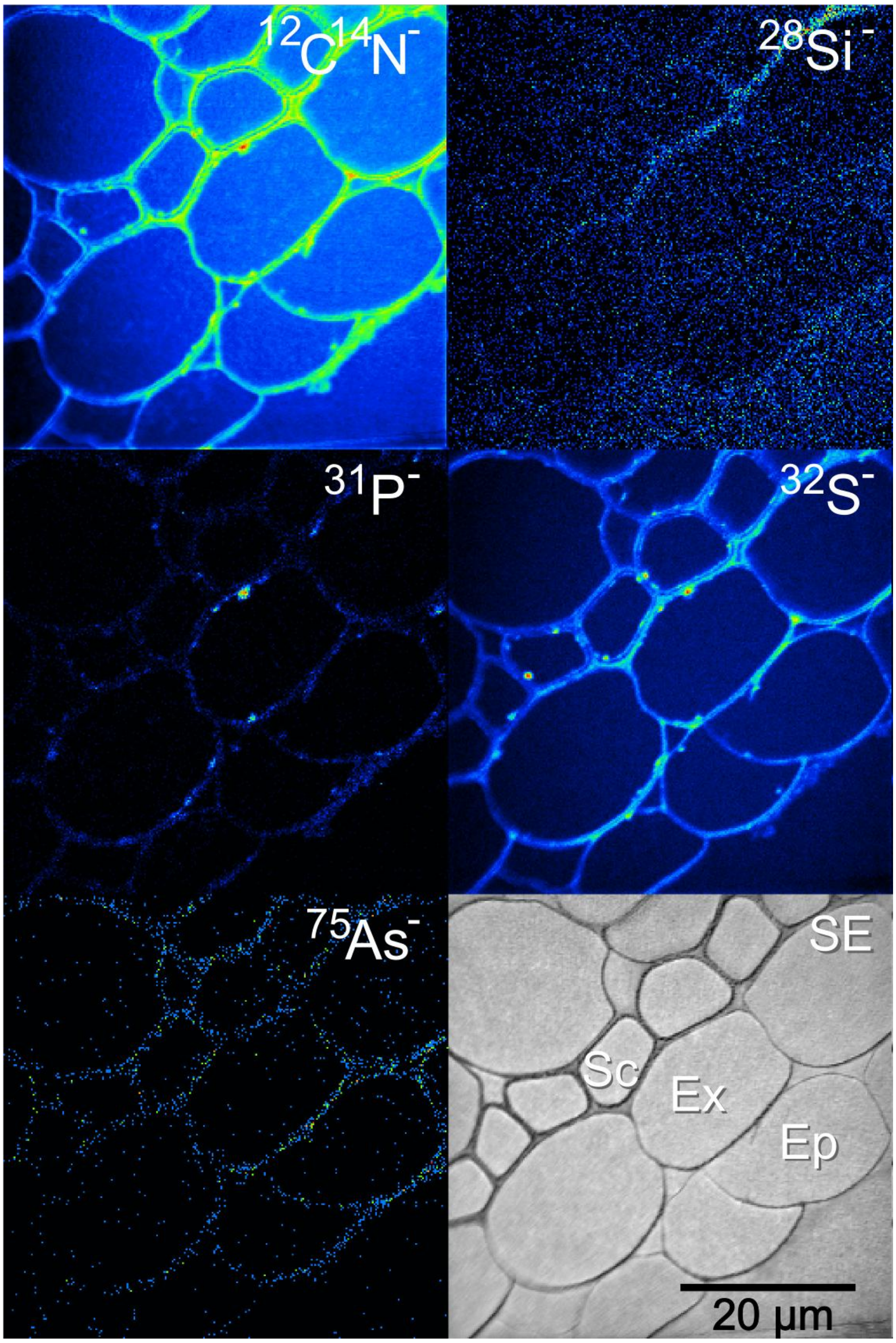
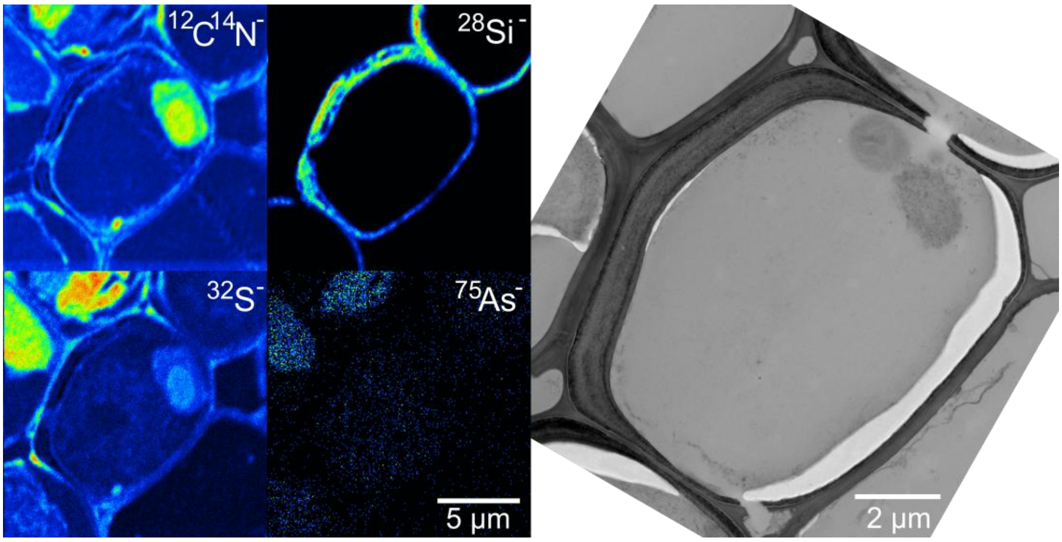
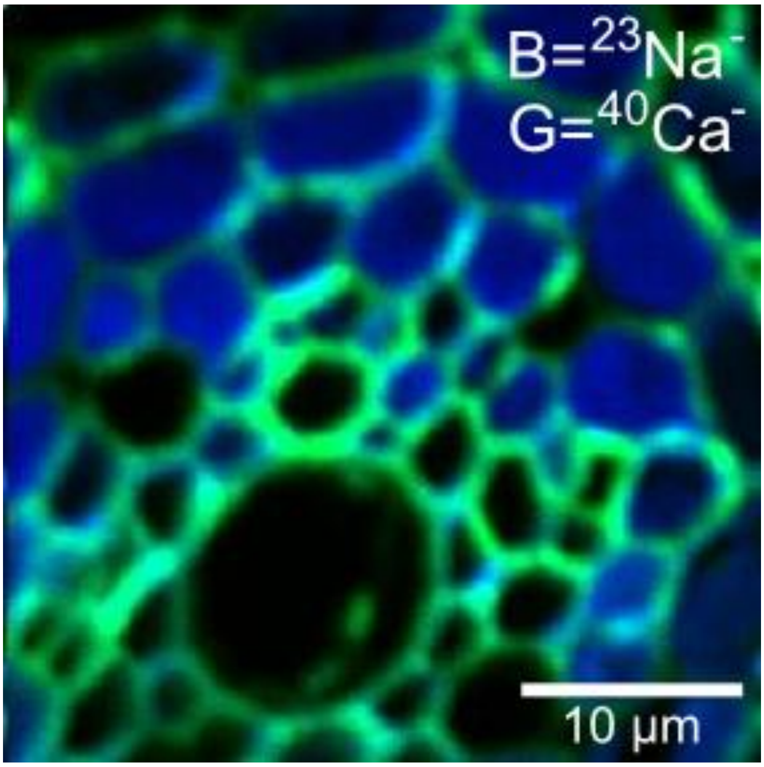
Supplementary information:



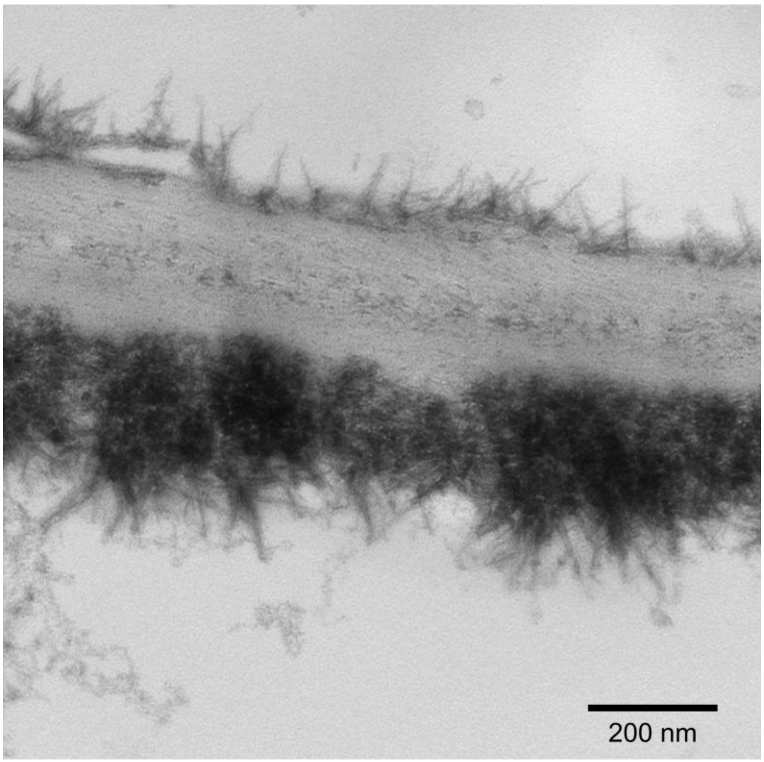
Supplemental Figure 1: NanoSIMS image of the outer edge of an *lsi2* mutant root without Fe plaque and treated with silicic acid and arsenate showing the outer four cell layers of the root. Without the Fe plaque on the epidermis there is very little As accumulation in this region. Ep = Epidermis, Ex = exodermis, Sc = sclerenchyma, SE = secondary electron image



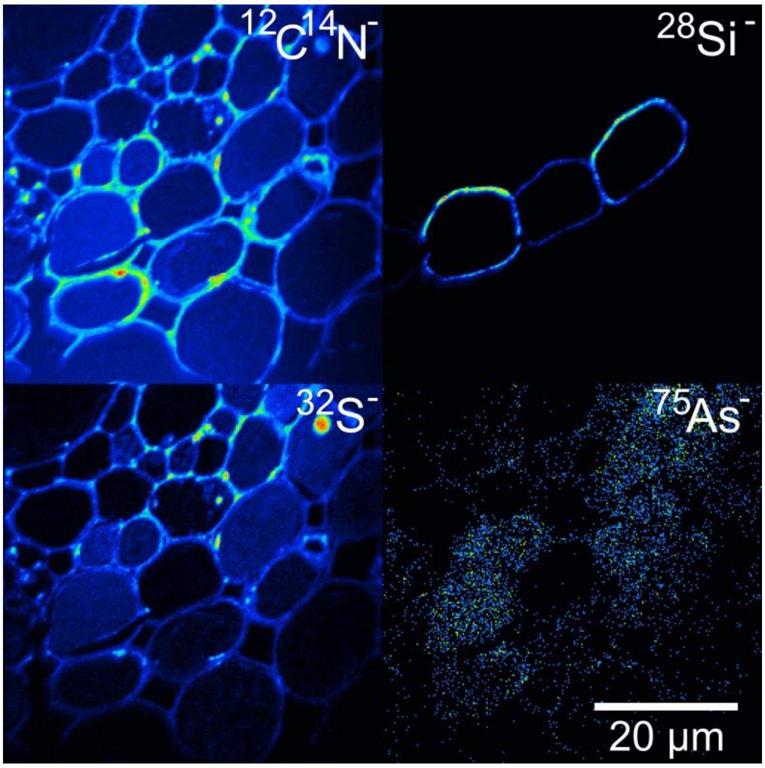
Supplemental Figure 2: A NanoSIMS and TEM image of the same endodermal cell from the mature region of a wild-type root. The proximal side of the cell wall is noticeably thicker and contains a higher concentration of Si than the distal side. The endodermal cells show some accumulation of As however the pericycle shows a much stronger localization of As.



Supplemental Figure 3: NanoSIMS image, acquired using the O^- source, from the stele region of a lsi2 mutant treated with arsenate showing $^{23}Na^+$ localised within the vacuoles and $^{40}Ca^+$ in the cell walls indicating no significant redistribution of the highly diffusible ions.



Supplemental Figure 4: A TEM image showing the morphology of the Fe plaque on the outer epidermis of the root. The outer edge (bottom) shows a much higher density of Fe needles than the inside of the cell (top) with the main reason likely to be that these cells are dead allowing Fe to pass into the cell.



Supplemental Figure 5: NanoSIMS image of the stele region of a *lsi2* mutant root treated with silicic acid and arsenate. The cells that show As accumulation in the vacuoles of the endodermis also show elevated S signals suggesting that As is stored as arsenite-thiol complexes.