P029 *CYCD*-mediated cell proliferation is required for the correct patterning of the *Arabidopsis* embryo

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During embryogenesis, the transition from a globular embryo stem to a heart shape embryo is associated with the initiation of two stem cell niches at the root and shoot pole, and activation of cell division giving rise to the embryonic root and shoot. In *Arabidopsis*, the RBR (Retinoblastoma-Related) protein plays a key role in root stem cell maintenance by inhibiting cell cycle progression. RBR is regulated by phosphorylation by CDK (cyclin-dependent kinase)/CYCD (CyclinD) complexes. RBR is encoded by a single gene and is expressed ubiquitously. In contrast, the *Arabidopsis* genome encodes 10 D-type cyclins. We previously examined the expression pattern of all D-type cyclins and found overlapping and distinct expression patterns in developing embryos. To examine CYCD function, loss of function mutant alleles were isolated for all *CYCD* genes, and higher order *cycd* mutant generated according to expression. Higher order *cycd* mutants display a monocotyledon phenotype at low penetrance associated with reduced cell proliferation in the nascent root cap. *cycd* mutant embryos display a reduced activity of the TCS:GFP cytokinin signaling reporter in the QC, suggesting an impaired stem cell niche. In addition, in specific combinations of *cycd* mutant alleles the columella stem cells undergo premature differentiation. Taken together, these observations suggest that combinations of D-type cyclin stimulate cell division in developing embryonic tissues such as the root, and that this might have wider implications for correct embryonic patterning.