

DYNAMIC GENETICS: A NEW VIEW OF PLANT GROWTH

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The shoot apical meristem (SAM) is a permanent population of stem cells that provides for all of the above-ground tissue in a growing *Arabidopsis* plant. Despite consisting of only a few hundred cells, the SAM is highly structured, and planes, patterns, and numbers of cell divisions are tightly regulated. The cells in the SAM control their division and patterns of gene expression based upon cell-cell communication - the SAM is a network of interacting cells that maintain their states and activities dynamically. We have developed a new set of methods for studying gene expression within, and cell division in, the SAM, and are developing computational methods for modeling it. The new methods combine fluorescent reporter genes, time-lapse confocal imaging, and regulatable versions of key regulatory genes such as those coding for ligands and transcription factors involved in the communication network. Computational models of the interaction network suggest new experiments, and real-time analysis of meristem activities after changes in gene activity test the computational models, leading iteratively to refined computational models of meristem activities.