

INTEGRATIVE BIOLOGY

The virtual flower: artefact or reality?

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During the last decade an impressive body of knowledge on floral meristem function has been generated. This concerns information on the genes involved, their expression patterns, cell differentiation, cell division patterns, etc. The complexity of these data is such, that an integrated view of our current knowledge on meristem function is no longer possible. Therefore, we are currently developing adapted mathematical and informatics approaches to integrate the knowledge and to advance the level of understanding in the field. Our efforts are oriented in two directions. First we are trying to link the gene regulatory networks to specific morphogenetic events. Although much is known on the overall composition of these networks, almost nothing is known on the way in which they interact with the structural elements of the cells and tissues to create particular shapes. It is therefore important to link specific gene activities to precisely quantified growth characteristics of the cells and tissues in which they are expressed.

In parallel to this largely descriptive effort, we are also developing modelling tools. To formulate and test hypotheses on spatial aspects such as flows of signalling molecules, strain within tissues, and the role of gene products in the spatial control of cell proliferation, we are creating a model in the form of a virtual meristem. This model will integrate as much spatial, dynamic and quantitative information as possible.