New model is a leap forward in understanding plant organ growth

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The same principles of growth and division apply to leaves of all shapes and sizes. Credit: John Innes Centre

Cells are the building blocks of life that grow and divide to create all living things.

But how cell growth and division is integrated to form structures such as plant leaves has until now remained unknown.

A team of researchers from the Coen Laboratory at the John Innes Centre addressed this problem using time-lapse imaging at a microscopic level to reveal the patterns of growth and cell divisions occurring as tiny buds morph into leaves.

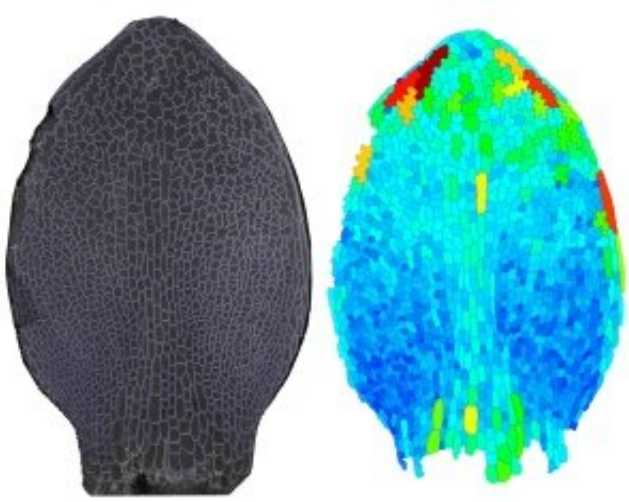
The team used computational modelling to create a virtual leaf with a layer of dividing cells. Using this framework, they developed and tested hypotheses for how growth of the tissue and increase in cell number through division could be regulated.

The authors propose an integrated model of leaf growth and division which generates dynamic distributions of cells sizes and shapes in different tissue layers, closely matching those observed experimentally.

The paper published in the peer reviewed journal *PLOS Biology* shows how genes control when and where cells grow and divide in the developing leaf bud. The result is a leaf with its characteristic shape and pattern of cell sizes.

Samantha Fox, lead author on the paper said: "The model provides a leap forward in our understanding of how growth and cell division within a developing leaf are coordinated. It helps to further our understanding of how complex organs are shaped by nature and will act as a framework for further experimental study."

The paper, "Spatiotemporal co-ordination of cell division and growth during organ morphogenesis," appears this week in *PLOS Biology*



In plants growth and division of cells can happen at the same time. Credit: John Innes Centre

Provided by John Innes Centre

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