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コーネル大学、リヨン高等師範学校、マックスプランク研究所植物科学センターとの国際共同研究 (HFSP)

N. Hervieux, S. Tsugawa, A. Fruleux, M. Dumond, A. Routier-Kierzkowska, T. Komatsuzaki, A. Boudaoud, J. C. Larkin, R. S. Smith, C. Li and O. Hamant: “Mechanical Shielding of Rapidly Growing Cells Buffers Growth Heterogeneity and Contributes to Organ Shape Reproducibility”, Current Biology, 27(22): 3468-3479 (2017) が当該号のハイライト記事のなかで紹介された。

(データ数理研究分野)

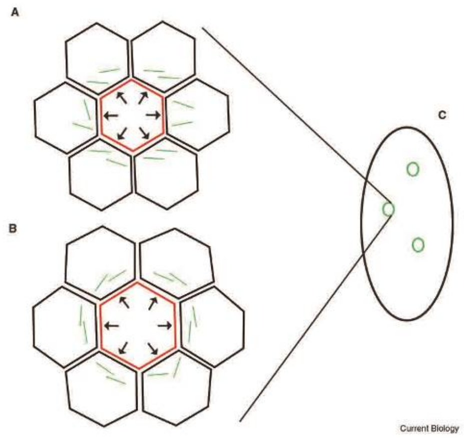

Figure 1. Microtubule re-organisation in response to growth-generated force presages mechanical isolation of the growing cell.
(A) An initiating trichome (red cell) exerts force on its neighbours as its growth increases. Microtubules (green) in the surrounding cells respond by aligning perpendicular to the local growth vector, creating a supra-cellular ring around the trichome (B). The orientation of microtubules is proposed to lead to stiffening of the cell walls, creating rings (green) around initiating trichomes within the sepal (represented by an ellipse; C), limiting any further influence of these cells on the planar growth of the sepal.

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Shape Control: Cell Growth Hits the Mechanical Buffers

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Organs are made from cells whose individual growth rates differ, yet the final shape of organs is highly robust. A new mechanics-based system is proposed to physically restrain cells that grow more than their neighbours, buffering their influence on organ size and shape.

Early work on growth and development by Thompson placed great emphasis on the role of mechanical forces [1]. However, in the intervening decades, much more focus has been placed on the role of chemical gradients in determining and decipherable, but the extent to which an individual cell (and its progeny) contributes to the ultimate form of an organ is generally difficult to predict. Moreover, early experiments in which patterns of cell division were altered often play in smoothing out local irregularities in growth. Sepals form the outermost ring of leaf-like organs of the flower, serving to protect the delicate inner organs required for gamete production. They have become established as a good