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The Tomato expression atlas: A new platform and database for interrogating fruit crop gene expression and co-expression with cell-type resolution

Most biochemical and molecular studies involving the extraction of transcripts or proteins from plant organs use a homogenized amalgam of tissues and cell types. This approach limits insights into cell specialization, and lower abundance molecules that are present only in certain cell types are often diluted below the level of detection. There is therefore a critical 'information void' when it comes to annotating and presenting gene expression data. We have been addressing this challenge in the context of understanding the entirety of gene expression during tomato fruit development, by coupling RNA-seq analysis with laser capture microdissection (LCM), which allows the precise isolation of individual fruit cells/tissue types. In addition to resolving gene expression down to the level of cell/ tissue type, this approach has enabled: (i) the identification of previously unannotated genes, demonstrating the value of LCM as a tool for gene discovery; (ii) inferences regarding gene functions, based on the patterns of tissue- or cell type-related expression. We have also been developing computed tomography as a non-invasive imaging tool to create a 3D 'virtual tomato', which includes internal structures, to provide a digital scaffold upon which to present transcriptome, or other 'omics' data sets as a 4D display. All data will be publicly accessible in a new database, the Tomato Expression Atlas. This database includes a novel user interface with a correlation matrix that reveals patterns of co-expressed genes at an unprecedented level of spatiotemporal resolution, thereby optimizing the identification of functionally related suites of genes.

Biography

Jocelyn K C Rose earned his Bachelor's degree at the University of Manchester, UK, and then worked for a biotechnology company, before relocating to the USA. He was awarded a PhD from the University of California Davis, and received his Post-doctoral training at the University of Georgia. He accepted a faculty position in the Department of Plant Biology, Cornell University. He is also the Director of Cornell's Institute of Biotechnology, and Director of the New York State Center for Life Sciences Enterprise. He is an elected Fellow of the Americann Association for the Advancement of Science.

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