15
MAI.
2014

de 11h à 12h

SÉMINAIRE

GENOMIC APPROACHES TO UNDERSTANDING STRUCTURAL COLOUR IN PLANTS

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While we often think of colour as synonymous with pigment, many of the most spectacular colours in nature are caused by differential interference of different wavelengths of light as they are scattered by nano structured surface features. There are many famous examples of such structural colour in animals, such as the iridescent scales on morpho butterflies and peacock feathers, but structural colour is also common throughout the plant kingdom, from algae to numerous groups of flowering plants. Structural colour in flowers is thought to aid in pollinator attraction, but it is also common in leaves, where its functional significance is not well understood. We are investigating the genetic basis and functional significance of structural colour in a variety of plant species with a range of approaches including genomics. We are working with genome-wide transcription data for two distinct lineages of iridescent plants: the living fossil Selaginella, which produces blue iridescence in the l eaves and the flowering plant Spiloxene which has iridescent flowers. We have obtained RNAseq data for four different tissues for each of four Selaginella species exhibiting a range of iridescence intensities and for Spiloxene capensis. For each species, de novo transcriptome assemblies were produced and used for differential gene expression analysis. Between 14,000 and 26,000 gene families were found for each species, with between 150 and 250 gene families exhibiting significant differences in gene expression across the four tissues examined. We have identified several genes that code for cell wall modifying enzymes that are differentially expressed only in iridescent species as candidates for the generation of cell wall layering responsible for iridescence in Selaginella. We are also investigating differentially expressed photosynthesis genes to test the hypotheses that iridescence may play a role in increasing photosynthetic efficiency or in photoprotection. We hope that t he use of functional genomics, coupled with detailed anatomical and developmental studies and optical modelling that are ongoing in our lab, will help to unravel the evolutionary origins and ecological roles of plant structural colour.