



VIRTUAL BIOLOGY COLLOQUIUM

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Hosted by Dr Long Yuchen

Metabolic regulation of growth: Focus on the leaf

By **Ali Ferjani**

Department of Biology, Tokyo Gakugei University

How organ size is determined is a longstanding question in biology of all kingdoms. In the simplest scenario, leaf size would be a function of cell number and size. Yet, accumulating evidence on the model plant *Arabidopsis thaliana* suggested the presence of compensatory mechanisms, so that when the leaf contains fewer cells, the size of each cell is unusually increased (the so-called compensated cell enlargement (CCE)). While decreased cell numbers in the compensation exhibiting *fugu5* mutants have been ascribed to reduced sugar biosynthesis from seed oil reserves (TAG), molecular mechanisms underlying CCE remain ill-known. Recently, IBA (a precursor of the phytohormone auxin) has emerged as a potential regulator of CCE. To further illuminate the role of IBA in CCE, we used a series of high-order mutants and analyzed their genetic interaction with *fugu5*. We found that while CCE in *fugu5* was promoted by IBA, defects in IBA-to-auxin conversion, auxin response, or the vacuolar V-ATPase activity alone cancelled CCE. This provides a scenario in which following seed germination, the low-sugar-state triggers auxin synthesis, leading to CCE through the activation of the V-ATPase, illustrating how fine-tuning cell and organ size regulation depend on interplays between metabolism and auxin levels in plants.



About the Speaker

*Dr. Ali Ferjani is an Associate Professor at the Department of Biology, Tokyo Gakugei University, Japan. By applying forward and reverse genetics, molecular developmental genetics, and metabolomic approaches to the model plant *Arabidopsis thaliana*, his research interests aim to elucidate the logics and the dynamic aspects of plant development, with a special emphasis on leaf size regulation and flowering stem development.*

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