Department of Life Science

Plant Molecular Biology

Research interest:

- Regulation of chloroplast development: chloroplast is an unique organelle in plant cell, mainly functioning in photosynthesis and biosynthesis of aromatic amino acids/lipids/pigments. The proteins required for chloroplast development and function are encoded by nuclear genome (~95%) and chloroplast genome (Fig.1). Based on genetic and biochemical techniques, we find a transcription factor Chloroplast Import Apparatus 2 (CIA2) which is the only reported nuclear regulator so far to control the expression of genes encoding chloroplast translocons, ribosomal proteins, and chaperonin. In consequence, CIA2 and CIA2-like (CIL) regulates the chloroplast development by coordinating the efficiency of chloroplast protein import and protein synthesis.
- 2. Regulatory mechanism of ubiquitin gene expression: eukaryotic ubiquitin (Ub) is generally participating in ATP-dependent proteolysis, DNA repair, cell cycle control, maintenance of chromatin structure, signal transduction, endocytosis, viral infection, regulation of physiological and stress responses. Ub in Arabidopsis is encoded by 5 poly-Ub and 4 Ub extension genes (Fig.2). We use biochemical and bioinformatic analyses to reveal that the differential expression of these Ub genes are regulated by various developmental and environmental factors.

Techniques used in study

Plasmid construction, plant transformation, organelle isolation, *in vitro* protein import, protein purification, western blotting, chromatin immunoprecipitation, microarray analysis, yeast-2-hybrid assay, bimolecular fluorescence complementation, reporter assay.



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Background:

PhD in Plant Biology, University of California at Davis, CA, USA

Funding:

Ministry of Science and Technology



Publications

- 1.Chun-Yen Yang and <u>Chih-Wen Sun</u>* (2020). Sequence analysis and protein interactions of Arabidopsis CIA2 and CIL proteins. Botanical Studies, 61:20.
- 2.Tin-Han Shih, Szu-Hsien Lin, Meng-Yuan Huang, <u>Chih-Wen Sun</u>*, Chi-Ming Yan* (2018). Transcriptome profile of cup-shaped galls in *Litsea acuminata* leaves. PLoS One, 13: e0205265.
- 3.Jui-Hung Chen, Chun-Lin Huang, Yu-Long Lai, Chung-Te Chang, Pei-Chun Liao, Shih-Ying Hwang^{*}, <u>Chih-Wen Sun</u>^{*} (2017). Postglacial range expansion and the role of ecological factors in driving adaptive evolution of *Musa basjoo var. formosana*. Scientific Reports, 7: 5341.



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