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Characterization of the Function of PpRGTB2 from Mutant Phenotypes

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Cover Page Footnote

1.Thole, J. M., Perroud, P. F., Quatrano, R. S., and Running, M. P. (2014) Prenylation is required for polar cell elongation, cell adhesion, and differentiation in Physcomitrella patens. Plant J. 78, 441–451 2."Gateway Entry Clones." Thermo Fisher Scientific, www.thermofisher.com/us/en/home/life-science/ cloning/ gateway-cloning/entry-clones.html. 3.Waldmann, Kristina GörmerHerbert. "Prenylation." Prenylation - an Overview | ScienceDirect Topics, Comprehensive Natural Products II, 2018, https://www.sciencedirect.com/topics/nursing-and-health-professions/prenylation. 4.Wójcik, Anna Maria. "Research Tools for the Functional Genomics of Plant MiRNAs During Zygotic and Somatic Embryogenesis." MDPI, Multidisciplinary Digital Publishing Institute, 14 July 2020, www.mdpi.com/ 1422-0067/21/14/4969/htm.

Characterization of the Function of PpRGTB2 from Mutant Phenotypes

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ABSTRACT

Protein prenylation, a common lipid post-translational modification, is required for growth and development in eukaryotes. One type, Rab geranylgeranylation is carried out by Rab-GGT, a trimeric enzyme composed of RGTA, RGTB, and REP, but its biological function is not well known. The moss *Physcomitrella patens (P. patens*) was used as a model organism due to its simple structure, limited cell types, sequenced genome, and its high gene targeting efficiency. *P. patens* has one copy of Rab-GGT α subunit (*PpRGTA1*) and two copies of β subunit (*PpRGTB1* and *PpRGTB2*). It has been found that the knockout of either *PpRGTB1* or *PpRGTB2* results in no visible phenotype, which indicates that these genes must be functionally redundant. The knockout of both *PpRGTB1* and *PpRGTB2* genes has shown to be lethal, which means Rab-GGT is required for viability. To determine the function of Rab-GGT, we used the RNA interference approach to down-regulate the expression level of *PpRGTB2* in the *PpRGTB1* knockout background to observe these phenotypic changes. *P. patens* grows in long thread-like filaments made of cells, also called protonema. Protonema includes two different cell types, chloronema and caulonema. Each of these cell types has distinct features that can be observed and quantified. This study focuses on quantifying *P. patens*' distinctive features in cell size, width, and the amount of protruding caulonema present in the wildtype vs *PpRGTB2* knockdown lines. The observed defects indicate the *RGTB2* gene plays a vital role in moss growth and development.

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