

**P6: Two ubiquitin-like proteins are involved in initiation and maintenance of apical cells in the moss *Physcomitrella patens*.**

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Apical cells in plant meristem are maintained through self-renewal, and give rise to various tissues and organs. How apical cells are specified and maintained is an important question in developmental biology. Mosses have two types of apical cells in gametophytes: protonemal apical cells and gametophore apical cells. In the moss *Physcomitrella patens*, the developmental process of the apical cell is well defined at the cellular level, and gene targeting based on homologous recombination is feasible. To understand molecular mechanism of initiation and maintenance of the apical cells, two sister Type II ubiquitin-like genes, *yh78* and *pph27a22*, which are predominantly expressed in both apical cells of *Physcomitrella*. Double disruption of these genes caused pleiotropic abnormalities, such as aberrant polar growth and abnormal cell division of the protonemal cells, and reduced growth of gametophores, suggesting that these genes are involved in cell elongation and division of the apical cells. To assess the molecular mechanisms caused these mutant phenotypes, microtubule (MT) array of the double disruptants and wild type were compared. Disorganized array of microtubules at interphase was observed in protonemata of the double disruptants. From metaphase to telophase, aberrant formation of a spindle and a phragmoplast was also observed in the double disruptants. These results indicates that these proteins likely function in the apical cells through MT organization. In addition, each of native *yh78* and *pph27a22* loci was replaced with *yh78-GFP* and *pph27a22-GFP* translational fusion genes. GFP signal was detected in the equatorial zone of phragmoplast, where cell plate are formed during cytokinesis, and subsequently in septum and cytoplasm, suggesting that these proteins are directly involved in cell plate formation. Defects of these type II ubiquitine-like gene functions in MT organization and cell plate formation likely caused the pleiotropic phenotypes, and new roles of type II ubiquitine-like genes in plants will be discussed.