

**Petunia Actin-depolymerizing Factors are Mainly Accumulated in Vascular Tissue and Its Gene Expressions are Enhanced by the First Intron.**

Sang-Gu Kim

*School of Biological Sciences, Seoul National University, Seoul 151-742, Korea*

Actin-depolymerizing factor (ADF) is one of the small actin-binding proteins that regulate actin dynamics in cells. We have previously isolated two cDNA clones, *PhADF1* and *PhADF2*, encoding ADF from *Petunia hybrida*. Co-sedimentation assay showed that the recombinant PhADF1 protein produced in *Escherichia coli* binds to F-actin at pH 7.0 and preferentially depolymerizes it at pH 8.0. Gene tree analysis indicates that the plant ADF family can be grouped into four classes, and *PhADFs* are included in class I. Southern blot analyses revealed that one to two copies of *PhADF* genes are present in petunia genome, and some other related isoforms also exist. Northern and western blot analyses indicated that *PhADFs* are closely related and abundantly expressed in every plant organ except pollen. In addition, they are highly accumulated in mature vegetative tissue (petal, leaf, and stem) and the gene expressions of *PhADFs* are regulated at transcriptional level. In addition, immunolocalization experiment confirmed that PhADFs are abundant proteins within the vascular tissue of petunia. To characterize the structure and regulation of ADF gene, we have isolated a genomic clone *PADF-1*, corresponding to *PhADF1* from a petunia genomic library. Comparison to cDNA sequence revealed that the coding region of *PADF-1* gene consists of three exons and two introns and the gene structure is conserved among other plant ADF genes. Promoter/GUS expression study in transgenic *Arabidopsis* demonstrated that *PADF-1* gene is mainly expressed in vascular tissues in all organs. In addition, fusion construct containing the first intron gave rise to high-level GUS activity than construct containing no intron. Therefore the first intron greatly enhances the expression of *PADF-1* gene expression.