

Proteomics: A tool to identify a novel protein from the moss *Physcomitrella patens*

Quoc Truong Hoang^{1,*}, Sung Hyun Cho^{1,a}, Yoon Young Kim¹, Hyun Young Shin¹, Sung Han Ok¹, Jung Myung Bae¹, Jeong Sheop Shin¹

¹*School of Life Sciences and Biotechnology, Korea University, Seoul 136-701, Korea*

^a*Current address: Department of Biology, Washington University, One Brookings Dr., St. Louis, MO 63130, USA*

*e-mail: hqtruong2002@yahoo.com, phone & fax: +82-2-927-9028

The moss *Physcomitrella patens* is a model plant for the study of gene function using a knockout strategy. To establish a proteome database for *P. patens*, we resolved over 1,500 obtained, 133 protein spots were matched to different expressed sequence tags (ESTs) using the public EST database. After BLASTX search with these ESTs, we were able to predict the identities of 90 protein spots. Most of the identified proteins were related to energy or primary metabolism. Comparative analysis between protonema and gametophore allowed us to identify 25 differentially expressed proteins in these two stages. Internal sequencing using LC/MS/MS was applied to characterize additional unidentified proteins in PMF, identifying some novel proteins in this species. Among those, a metallothionein type 2 (PpMT2) protein was identified and characterized, which was highly upregulated in gametophore tissue at the protein level as well as the mRNA level. The expression of PpMT2 was induced by solid culture. Northern blot analyses shown that PpMT2 is induced in response to various abiotic stresses such as copper, cadmium, cold, IAA, and ethylene. We suggest that PpMT2 is not only involved in metal binding and sequestering, but also in many biological aspects as a metal messenger or a protein with additional functions. Taken together, our results confirmed that EST databases in conjunction with PMFs could be used to identify proteins from organisms when only incomplete genome sequence information is available.

Fig. Functional classification of proteins identified from the gametophore of *Physcomitrella*

